

# POPULAR MECHANICS

## MAGAZINE

WRITTEN SO YOU CAN UNDERSTAND

FIELD TESTED. MADE GREAT BY THE WAY. 1954

FIELD TESTED. MADE GREAT BY THE WAY. 1954



*In This Issue*  
**12 NEW CARS FOR '55**



**THE PLYMOUTH V8** Copyrighted material

*Hoche*

# FORD THUNDERBIRD

*The New Personal Car with the Sports Car Flair  
Features the Spark Plugs in Your Future,*

## NEW **TURBO-ACTION** CHAMPIONS!



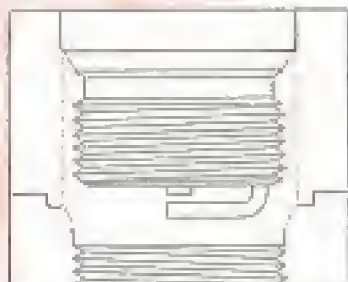
The spark plug in your future is definitely the new Turbo-Action Champion which powers the mighty Ford Thunderbird.

So superior is the performance of this new Champion in the very latest design, high-output engines that other leading automobile manufacturers soon will follow the Thunderbird in adopting it as standard equipment.

Besides overcoming the number one problem of modern high-compression engines—fouling at continual low-speed driving—Turbo-Actions clear the way for higher compression, higher horsepower engines of the future.

Because of their new seating design and larger thread size, Turbo-Action Spark Plugs will fit only those new engines designed for them.

Your present car, however, will continue to give you top performance with regular standard Champions.



Greater clearance in the firing end permits turbulent gases to keep the insulator free of harmful deposits. Heat range, the temperature zone in which spark plugs operate efficiently, is extended to the widest limits in automotive history to meet the requirements of new, high-output engines.

Exclusive tapered Turbo-Action seating design forms a positive lock with a mating surface in the cylinder head without using a gasket. Correct installation is automatic and Turbo-Action Spark Plugs remain firmly fixed and accurately positioned in the combustion chamber.

AVAILABLE AT FORD AND OTHER CHAMPION DEALERS

CHAMPION SPARK PLUG COMPANY, TOLEDO 1, OHIO



Do you see what my smart husband has done? As an anniversary present he gave me a complete new kitchen — and added the finishing touch *himself* by installing a brand-new sparkling floor of marvelous Goodyear All-Vinyl! (The picture's in black and white, but I wish you could see the *colors* of those tiles!)

Honest, when he went downtown and came back with that handy little Goodyear installation kit, a can of adhesive and 3 cartons of tile—I said, "Who's going to do it?"

"Me," Bill replied, as he thumbed through the instruction folder. And he did—a beautiful job—in one day!

Now I've got a floor as modern as the rest of my new kitchen! You can spill practically anything on it and it wipes clean as a whistle. Best of all — *it never needs waxing*, because it's 100% all-vinyl construction — pre-polished at the factory to a natural, lasting luster. No wonder I love my wonderful husband!

*Note:* If you'd like to get a folder that gives all the facts on how easy it is to install Goodyear All-Vinyl in your own home—plus full-color suggestions—then just drop a post card to:

Goodyear, Flooring Department X-8318, Akron 16, Ohio

Never  
needs  
waxing!



**FLOR-MASTER INSTALLATION KIT** provides all tools and instructions needed to do a professional flooring job in jig time. Yours at a low price at better flooring dealers' where Goodyear All-Vinyl Flooring is sure to be featured.

Flor-Master—T. M. The Goodyear  
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This One

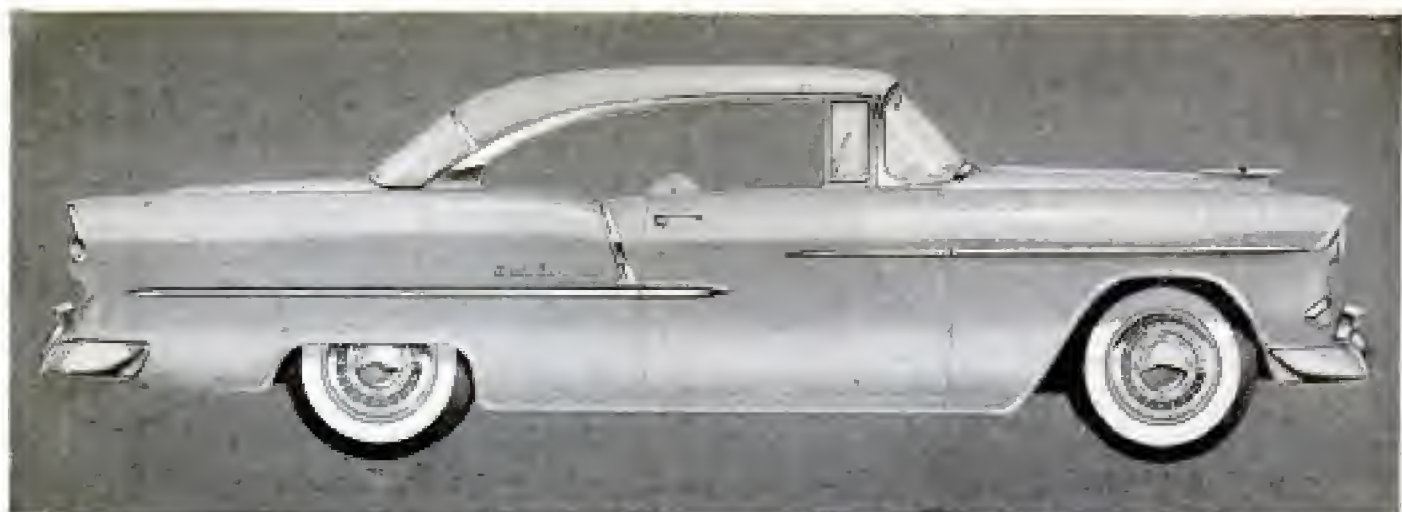


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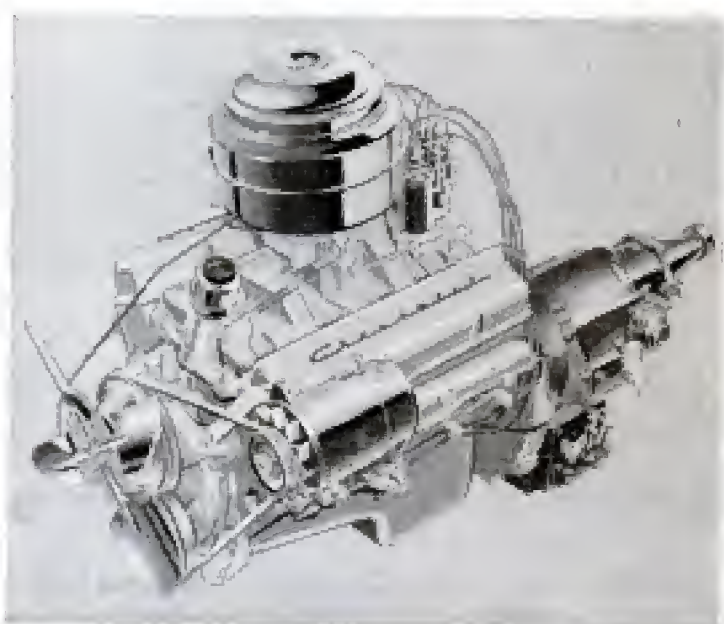


*The smartest yet—1955 Chevrolet Bel Air Sport Coupe*

Everything's new everywhere you look!

the motoramic

# Chevrolet for '55



*New 162-h.p. V8 has 8 to 1 compression ratio—  
and the shortest stroke in the low-price field.*

**N**EW Show-Car styling—new Sweep-Sight windshield—three new engines ("Turbo-Fire" V8 and two new "Blue-Flame" 6's)—new Glide-Ride front suspension—new outrigger rear springs—new Anti-Dive braking control—new ball-race steering—new 12-volt electrical system—new standard shift transmission or (optional at extra cost) new Overdrive transmission or improved Powerglide, new and improved automatic power helpers.

Chevrolet pulled out all the stops this year, threw every ounce of engineering and production skill into creating a car that is brand-new all the way through. We can't even begin to list all the changes here . . . all the new handling ease, roadability, riding comfort, visibility and wrapped-in-plush luxury. You'll have to drive it to know what the word *new* really can mean . . . when the world's leading manufacturer of cars touches off a revolution! See your Chevrolet dealer for a demonstration. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

More Than a New Car...a New Concept of Low-Cost Motoring!

# Popular Mechanics Magazine

Registered in U. S. Patent Office and Canada

H. H. WINDSOR, Founder

H. H. WINDSOR, JR., Editor and Publisher



## Next Month

THAT CAR Floyd Clymer is inspecting leads all sports cars in total sales in this country. It leads the pack in foreign-car sales, just as it frequently leads the pack in road races, for it is one of the fastest production cars in the world. Recognize it? It's the Jaguar, a sleek little machine that's equally at home in front of a country club or whipping around a corner at Watkins Glen. Ever wonder just what a Jaguar driver is thinking as he zips past you? Does he really like his car, or is he just showing off? You'll find out next month when the owners themselves report on this most popular of all foreign makes. Floyd Clymer's expert road test is included as usual

Information not listed on articles in the index, starting on page 12, frequently is listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge. A copy may be obtained by writing to the Bureau of Information, Popular Mechanics, 200 E. Ontario, Chicago 11, Ill.

Published monthly by Popular Mechanics Company, 200 E. Ontario St., Chicago 11, Ill. H. H. Windsor, Jr., president; Wm. Harrison Phillips, exec. vice-pres.; D. F. Windsor, vice-president and secretary-treasurer; H. H. Windsor III, vice-president; Claver L. Perkins, advertising manager; Alan M. Dease, circulation manager. Single copy in the United States and Canada, 35 cents; subscription rates in the United States and possessions, Canada, Philippines and countries of the Pan-American Postal Union, 1 year \$3.50-2 years \$6.50; 3 years \$9.00. In all other countries add \$1.00 a year over United States prices for overseas postage. If you plan to move, notify us at least 30 days in advance so you will not miss an issue. Give both old and new addresses. Entered as Second Class Matter, September 15, 1909, at the Post Office at Chicago, Illinois, under Act of March 3, 1879. Entered as Second Class Matter at Post Office Dept., Canada. Registered as Second Class Matter at the Post Office at Mexico, D. F., Mexico, June 20, 1950. Copyright 1954 by Popular Mechanics Company. Copyright under International Copyright Union. Copyright in France. All rights reserved under Pan-American Copyright Union. Printed in the United States of America.

Volume 102 DECEMBER 1954 Number 6

Address all communications to: 200 E. Ontario St., Chicago 11, Ill.

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Sometimes it's smart to leave your car home. It may help you...

# save up to 40% on your auto insurance!

*Read why careful drivers get top-notch protection at rock-bottom rates with*

## STATE FARM MUTUAL

As long as some folks insist on mixing alcohol and gasoline, there'll be times when you'll be better off *not* driving.

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—dependability. State Farm insures more than 3 million cars, more by far than any other company...

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—fast, fair, friendly claim service through our own 7,000 agents and 700 claim expeditors.

For full details—and the exact amount you can save—call the nearest agent listed under "State Farm Insurance" in the yellow pages of your phone book. Or write: State Farm Mutual, Dept. J-17, Bloomington, Illinois

### Can You Qualify?

*State Farm aims to insure careful drivers only. Drivers who can be counted on to:*

- Avoid mixing alcohol and gasoline
- Be patient in heavy traffic
- Obey speed laws
- Heed crossing signals
- Make full stop at stop signs
- Always signal stops and turns
- Have car checked regularly
- Pass only when coast is clear

# STATE FARM MUTUAL

*"the careful driver insurance company"*



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State Farm Fire and Casualty Company**

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# Step Up Your Pay LEARN TO FIX APPLIANCES at Home in Spare Time

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men who know this  
Profitable Trade.**

Get into a field where you can do important work, have a secure future. Electrical appliance repair offers OPPORTUNITY FOR YOU. Every wired home has an average of 8 electrical appliances. Up to 10 million new appliances are being sold every year. Owners pay well to keep them in repair and enjoy the convenience they provide. That means a fast growing need for trained men.

## Learn and Earn with Tester You Build

Our training includes the parts to build a sturdy, portable appliance tester following our illustrated, easy-to-understand instructions. This multi-use tester helps you locate electrical defects quickly and easily, equips you to do professional trouble-shooting. You use it to learn electrical appliance repair techniques. Gives you the practical training of actually building the tester and a valuable piece of equipment for future use.

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in this corner.....

## THE EDITORS



### To the Editor:

I wish I could adequately express how pleased I am with the entire presentation of the Survey House (PM, Oct. 1954).

Everything about it was superb—the copy, the art, the layout, everything!



It was also quite a surprise to receive 42 inquiries in Monday's mail, inasmuch as the magazine did not appear on our local newsstands until that day.

Rudolph A. Matern,  
Jamaica, Long Island, N. Y.

Mr. Matern was the architect of our Survey House, designed for the October issue from the desires of our readers as expressed in 3561 answers to questionnaires about their ideal home. At the time this is written, 1909 readers had inquired about blueprints of the house.

### Tidings from Hong Kong

Through the U. S. Information Agency we hear that PM is doing its bit of missionary education among the Chinese at Hong Kong. Following is a story just received from the Agency's Washington office:

The U.S. Information Agency's library in Hong Kong is not only providing young Chinese with a knowledge of English and a glimpse of the culture and way of life of far off United States, but it is turning their young minds into constructive channels of science and research.

This came to light when Mr. Haitz T. Y.

(Continued to page 8)



# 5 reasons why ACCOUNTANCY



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**REASON #1.** If you were an expert accountant right now, chances are you would find yourself among the highest-paid of all professional men and women. Even back in "depression years," surveys showed that accountants earned more on the average than men in other major professions.

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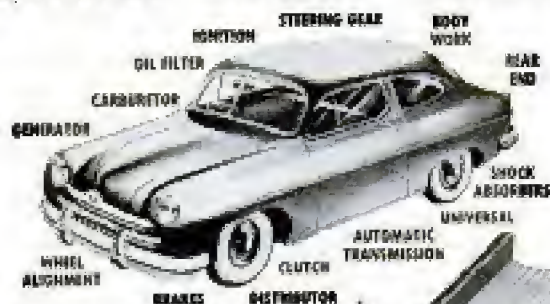
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# HOW TO FIX ANY PART OF ANY CAR

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Address.....

City..... State.....

Check box and save 35¢ delivery charge by enclosing WHITE coupon entire payment of \$6.95 for Auto Repair Manual (or \$8 for Truck & Tractor Repair Manual.) Some present-reform privileges.

(Continued from page 6)

Chang came by the library to get some old magazines . . . In particular he wanted back issues of Popular Mechanics.

Not long before, Chang's 15-year-old son had created a crude microscope through which he discovered the fascinating activity of the amoeba world. Overjoyed with the new toy he had made by copying a drawing from Popular Mechanics, young Chang attempted a miniature telescope.

Now, in the evening, his father explained, the youngster is discovering stars which he had been unable to see with his naked eye. In the daytime he watches fishing boats in the distant harbor.

Thus absorbed with invention, young Chang plods away at mastering English, so that he can better understand the text under the drawings and build more instruments of the sort which open up new horizons.

"I find my children have improved reading ability in English and increased common sense in scientific knowledge," Chang told the Director of the U.S. Information Agency's library. "There are thousands of children and teen-agers in Hong Kong benefited by the library just as mine are."

**To the Editor:**

Your article in August about the Florida airboat is very interesting but you don't have to go all the way to Florida to find airboats. The Susquehanna River north of Harrisburg is quite popular for the up and coming airboat. In June 1953 an airboat traveled from Millersburg, Pa., up the Susquehanna via the North Branch all the way



to Oswego, N. Y. The airboat we built here at the airport is strictly a fishing boat and can traverse any spot in the river as long as the ground is wet.

Eugene C. Breiner,  
Shop Foreman,  
Danville Airport,

**To the Editor:**

I am very grateful for this opportunity to write you. I am a Korean boy living in

(Continued to page 10)

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Blueprints</li> <li><input type="checkbox"/> Sanitary Engineering</li> <li><input type="checkbox"/> Structural Engineering</li> <li><input type="checkbox"/> Surveying and Mapping</li> </ul> <p><b>DRAFTING</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Aircraft Drafting</li> <li><input type="checkbox"/> Architectural Drafting</li> <li><input type="checkbox"/> Electrical Drafting</li> <li><input type="checkbox"/> Mechanical Drafting</li> <li><input type="checkbox"/> Mine Surveying and Mapping</li> <li><input type="checkbox"/> Ship Drafting</li> <li><input type="checkbox"/> Structural Drafting</li> </ul> <p><b>ELECTRICAL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electrical Engineering</li> <li><input type="checkbox"/> Electrical Maintenance</li> <li><input type="checkbox"/> Electrician <input type="checkbox"/> Contracting</li> <li><input type="checkbox"/> Lineman</li> </ul> <p><b>HIGH SCHOOL</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Commercial</li> <li><input type="checkbox"/> Good English</li> <li><input type="checkbox"/> High School Subjects</li> <li><input type="checkbox"/> Mathematics</li> </ul> | <p><b>LEADERSHIP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Foremanship</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Leadership and Organization</li> <li><input type="checkbox"/> Personnel-Labor Relations</li> </ul> <p><b>MECHANICAL AND SHOP</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Gas—Electric Welding</li> <li><input type="checkbox"/> Heat Treatment <input type="checkbox"/> Metallurgy</li> <li><input type="checkbox"/> Industrial Engineering</li> <li><input type="checkbox"/> Industrial Instrumentation</li> <li><input type="checkbox"/> Industrial Supervision</li> <li><input type="checkbox"/> Machine Design-Drafting</li> <li><input type="checkbox"/> Machine Shop Inspection</li> <li><input type="checkbox"/> Machine Shop Practice</li> <li><input type="checkbox"/> Mechanical Engineering</li> <li><input type="checkbox"/> Quality Control</li> <li><input type="checkbox"/> Reading Shop Blueprints</li> <li><input type="checkbox"/> Refrigeration</li> <li><input type="checkbox"/> Sheet Metal Worker</li> <li><input type="checkbox"/> Tool Design <input type="checkbox"/> Toolmaking</li> </ul> <p><b>RADIO, TELEVISION</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Electronics</li> <li><input type="checkbox"/> Practical Radio—TV Eng'ing</li> <li><input type="checkbox"/> Radio and TV Servicing</li> <li><input type="checkbox"/> Radio Operating</li> <li><input type="checkbox"/> Television—Technician</li> </ul> | <p><b>RAILROAD</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Air Brakes <input type="checkbox"/> Car Inspector</li> <li><input type="checkbox"/> Diesel Locomotive</li> <li><input type="checkbox"/> Locomotive Engineer</li> <li><input type="checkbox"/> Section Foreman</li> </ul> <p><b>STEAM AND DIESEL POWER</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Combustion Engineering</li> <li><input type="checkbox"/> Diesel—Elec. <input type="checkbox"/> Diesel Eng'g</li> <li><input type="checkbox"/> Electric Light and Power</li> <li><input type="checkbox"/> Stationary Engines</li> <li><input type="checkbox"/> Stationary Steam Engineering</li> </ul> <p><b>TEXTILE</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Carding and Spinning</li> <li><input type="checkbox"/> Cotton, Rayon, Woolen Mfg.</li> <li><input type="checkbox"/> Finishing and Dyeing</li> <li><input type="checkbox"/> Loom Firing</li> <li><input type="checkbox"/> Textile Designing</li> <li><input type="checkbox"/> Textile Eng'g <input type="checkbox"/> Throwing</li> <li><input type="checkbox"/> Warping and Weaving</li> </ul> <p><b>MISCELLANEOUS</b></p> <ul style="list-style-type: none"> <li><input type="checkbox"/> Domestic Refrigeration</li> <li><input type="checkbox"/> Marine Engineering</li> <li><input type="checkbox"/> Ocean Navigation</li> <li><input type="checkbox"/> Shipfitting</li> <li><input type="checkbox"/> Short Story Writing</li> <li><input type="checkbox"/> Telephony</li> </ul> |
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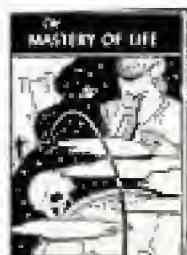


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(Continued from page 8)

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In our July 1953 issue we presented this wind maker as an orchardist's friend, protecting citrus groves from frost damage. Now it's trying out for a new job. Four of the wind towers have been installed experimentally along the New Jersey Turnpike to test their effectiveness in dissipating fog along the highway.



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"Model Railroad With Sound Effects" is the subject of our color story in this issue. Chet Tayloe of North Hollywood, Calif., is a realist. He wanted a model railroad that not only looked but sounded like the real thing. Here he is installing the loudspeaker in a church to produce subdued organ music, the sound of a choir singing, even parts of a sermon that can be heard as the whistling trains roll by. Don't miss the story beginning on page 113.



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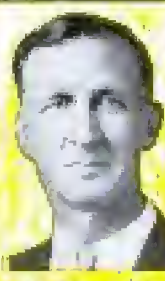
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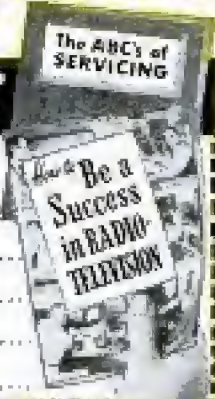
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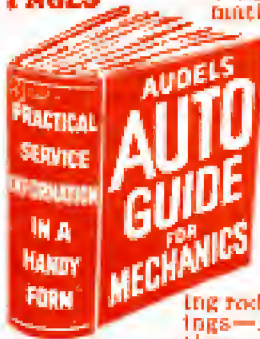
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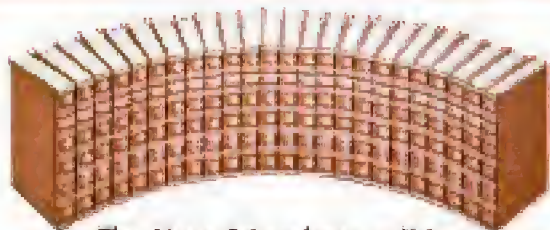
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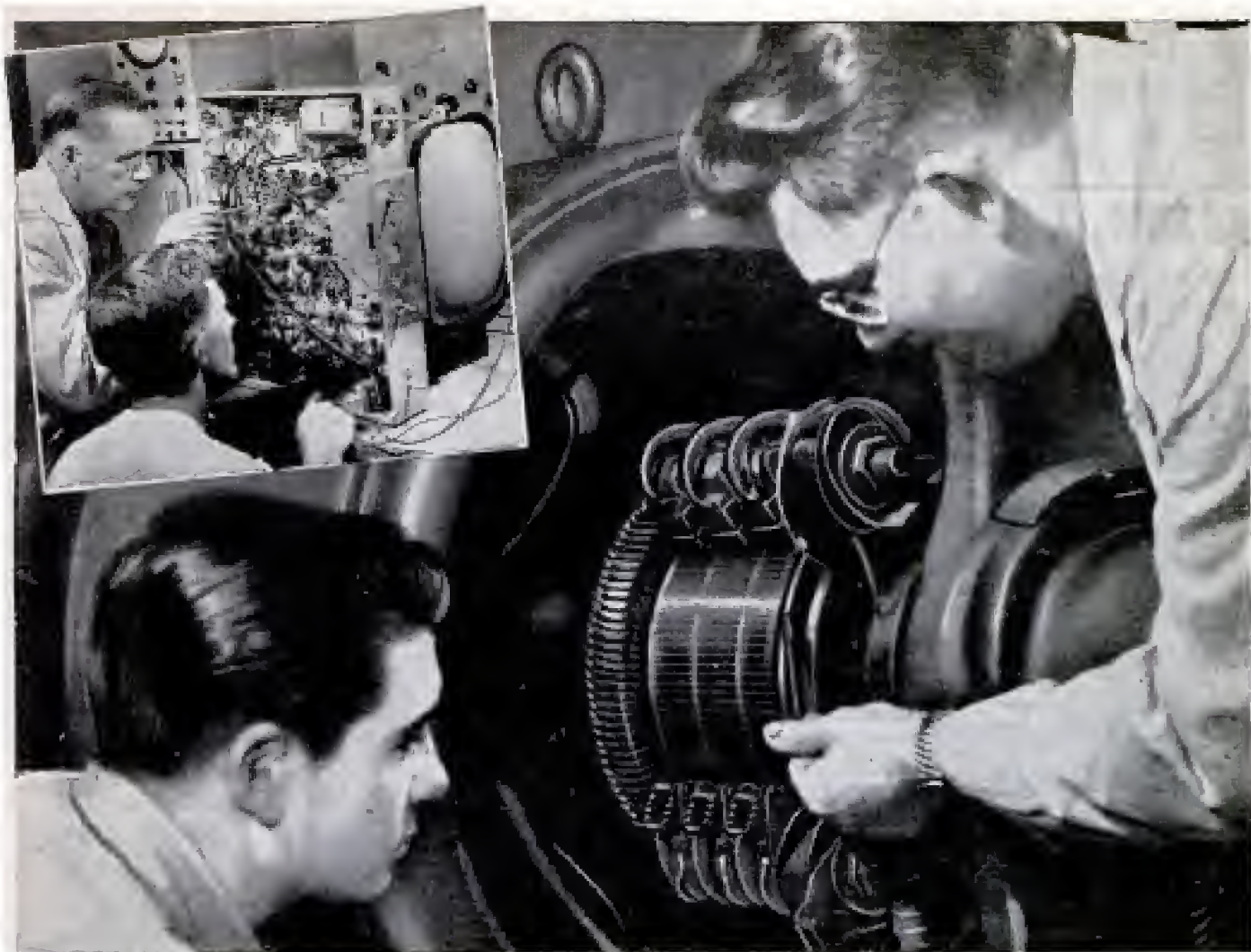
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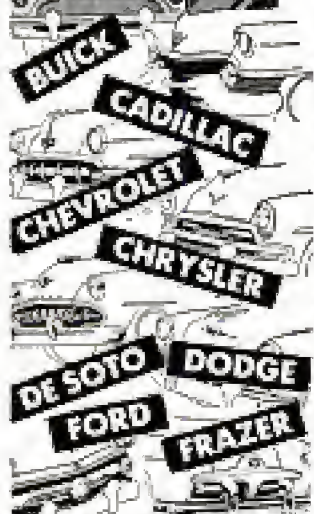


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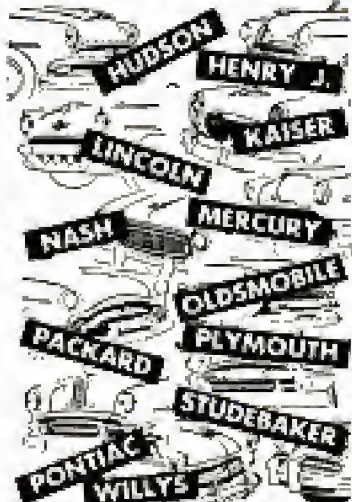
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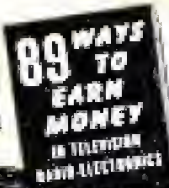
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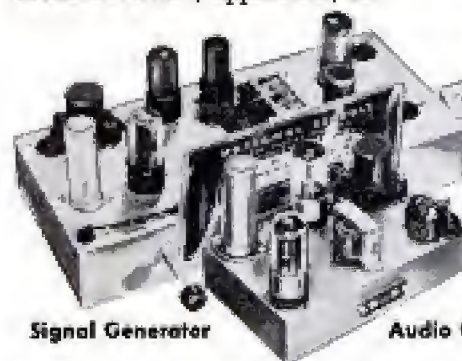
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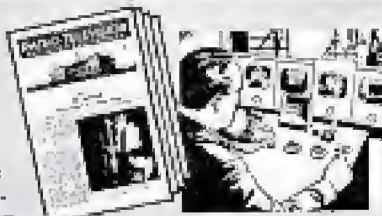
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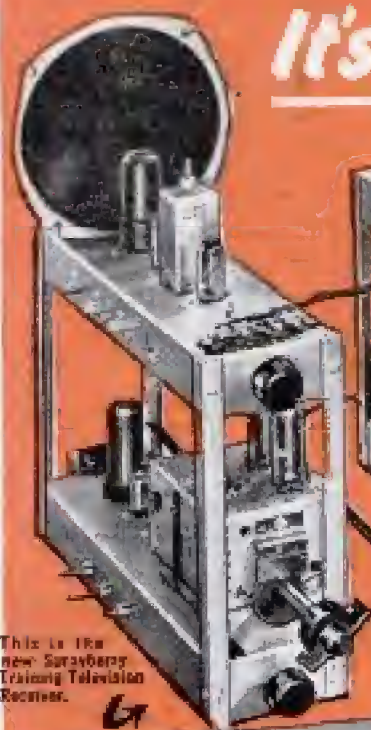
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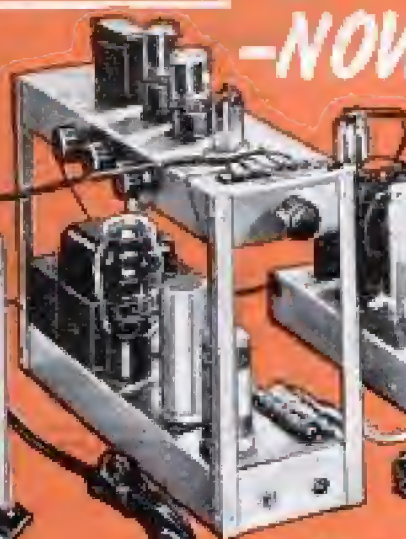
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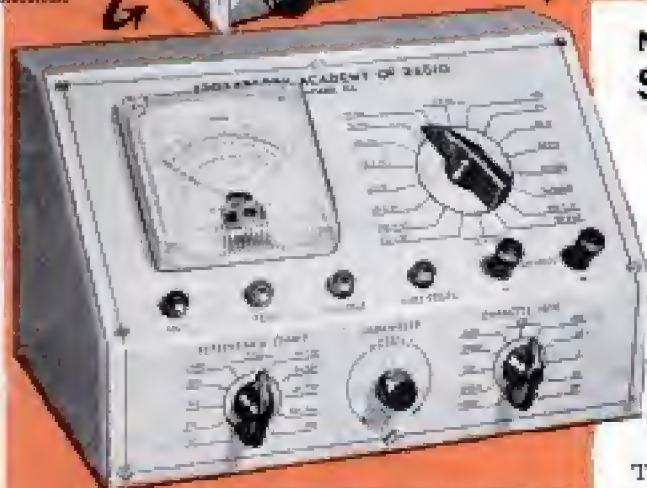
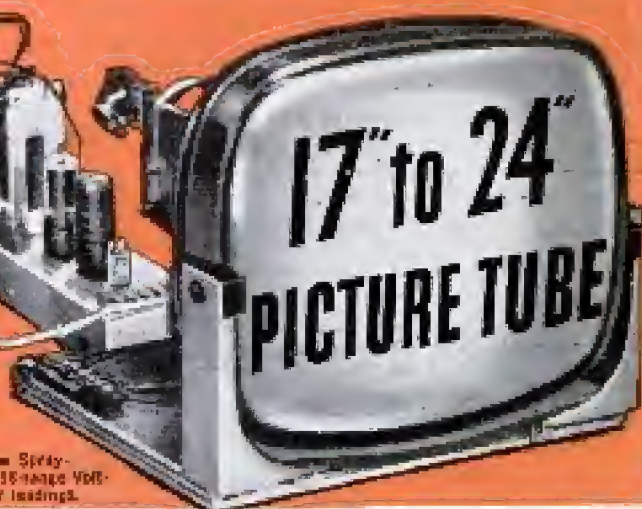
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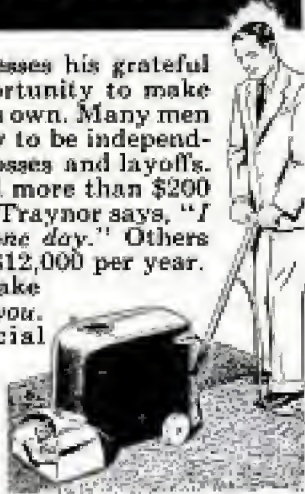
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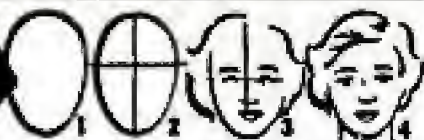
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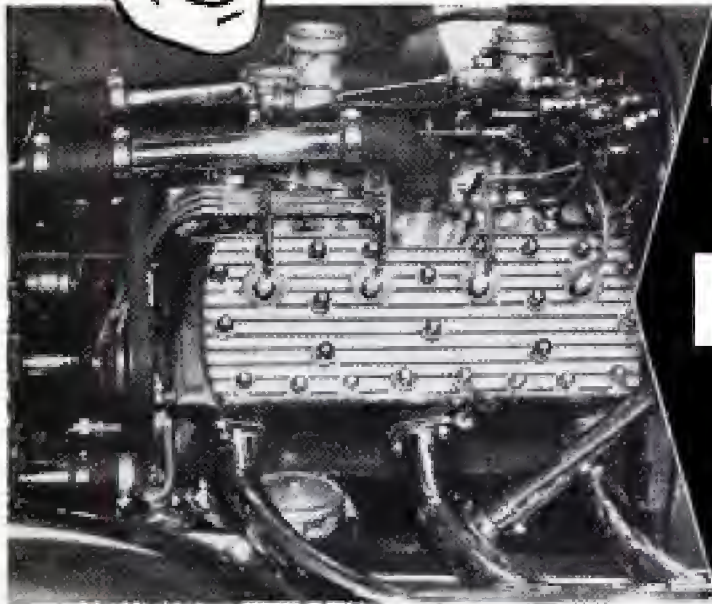
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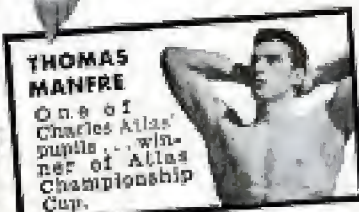
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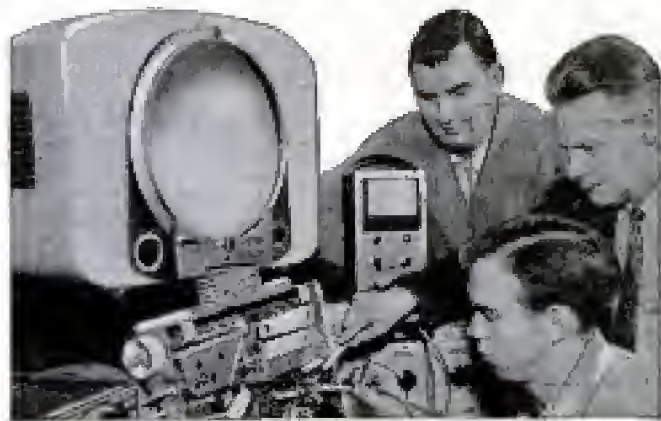
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700x16	6.35	760x15	6.85	750x18	10.95	800x20	19.95
750x16	8.45	800x15	8.35	30x3	13.25	1000x20	20.45
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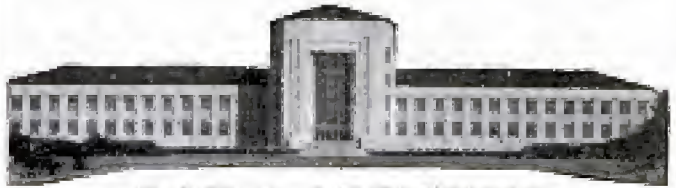
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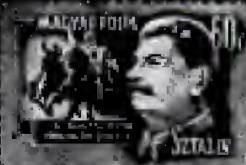
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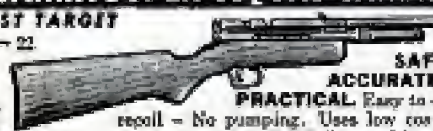
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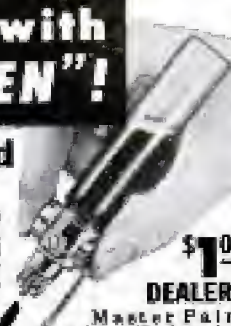
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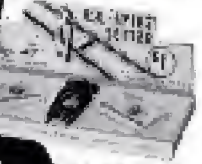


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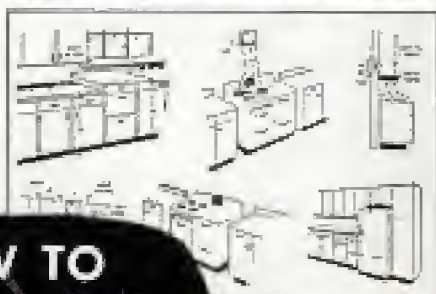


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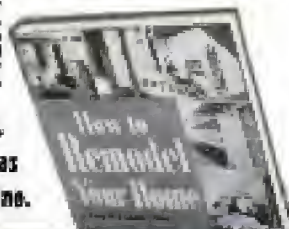
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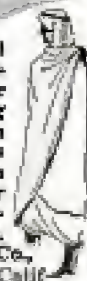
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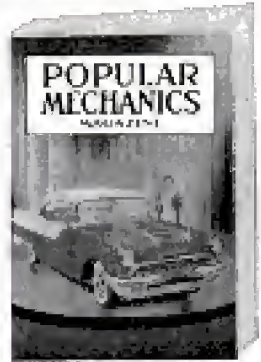
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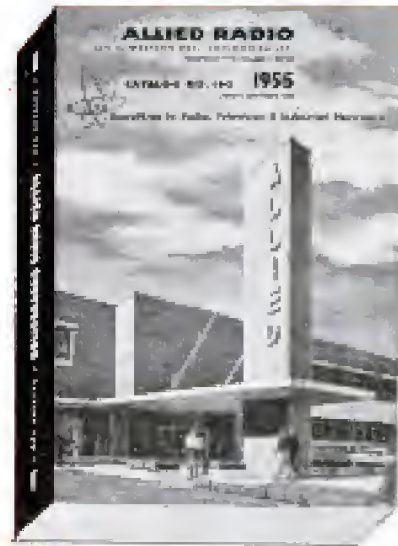
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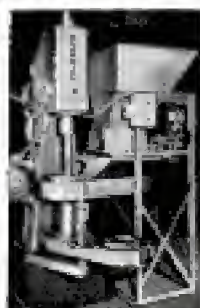
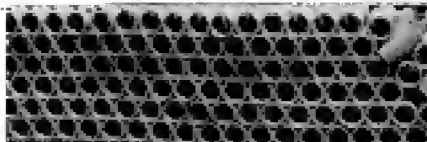
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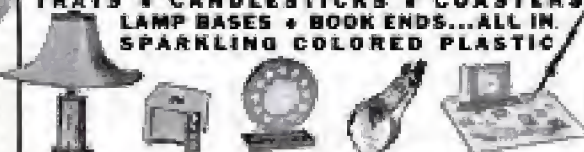
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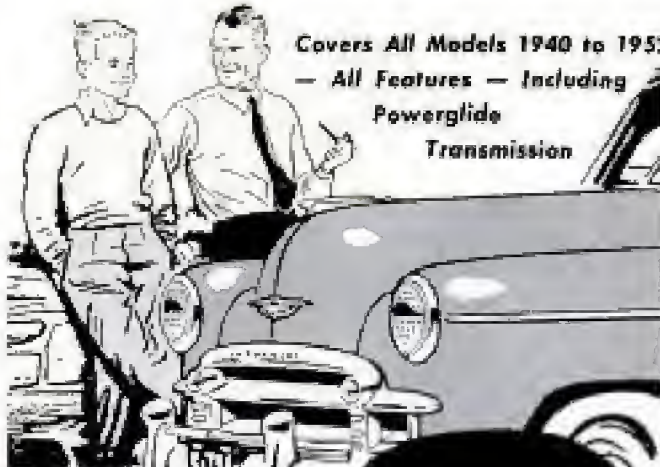
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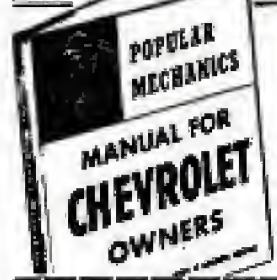
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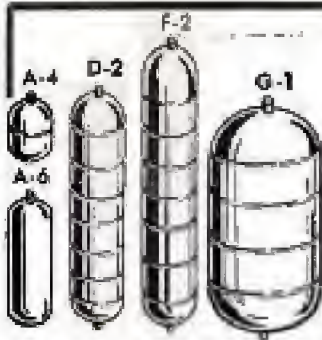
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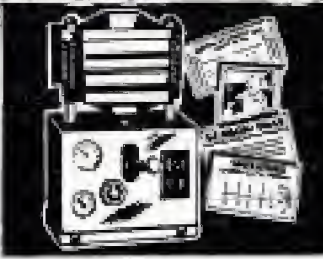
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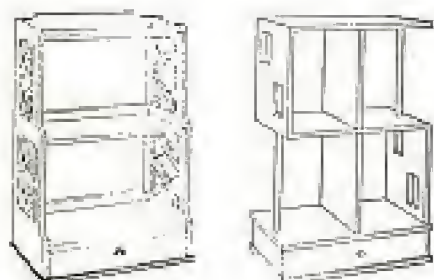
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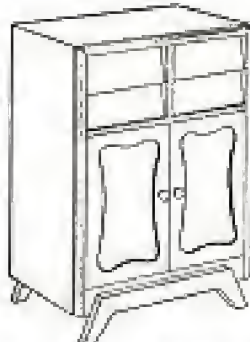
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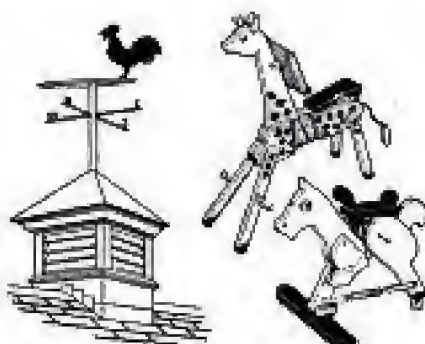
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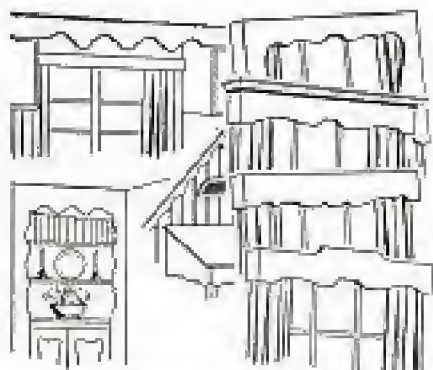
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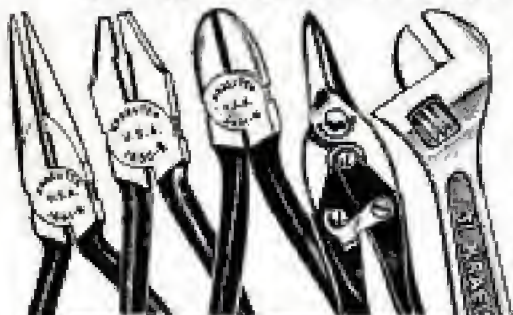
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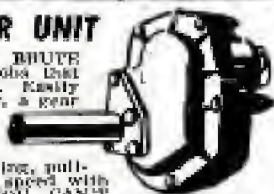
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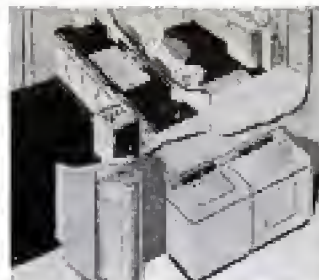
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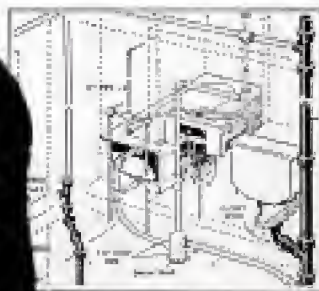
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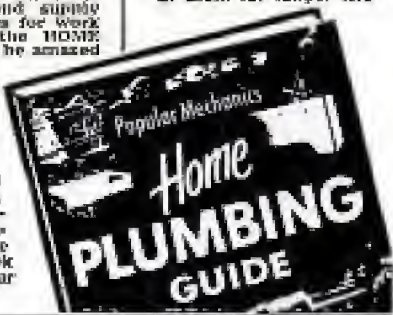
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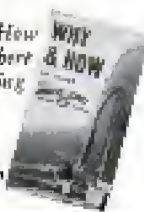
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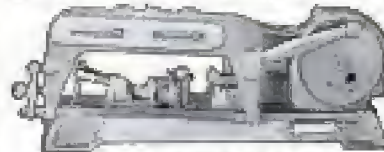
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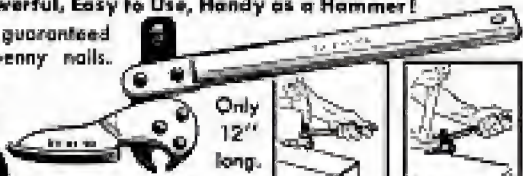
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\* *Confidentially, men, it would be smart to leave this page where the right person can't miss it!*

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# POPULAR DECEMBER 1954 MECHANICS

WRITTEN SO YOU CAN UNDERSTAND IT  
VOL. 102 NO. 6

## GAMMA RAY MAGIC

By **Dr. Samuel S. Jones**

*Research Associate at the Knolls Atomic Power  
Laboratory, Schenectady, N. Y.*

**YOU CAN'T SEE**, hear, touch, taste or smell them, but they are a very real ingredient of the Atomic Age. They are gamma rays, a powerful and penetrating product of nuclear fission. They can be a deadly enemy or helpful servant. It all depends on how you handle them. But either way, gamma radiation is a relatively little-used form of energy that has great promise for the future.

This prophetic usefulness doesn't come entirely from the amount of gamma energy available. It will never replace coal and oil as an abundant heat source. But gamma rays can serve a different purpose because of the peculiar way they are absorbed in matter. As if shot from a battery of infinitely small atomic machine guns, gamma-ray bullets go deep into the heart of whatever they strike. The mysterious things that happen then are nothing short of magic.

First a word about gamma radiation itself. Actually it's made of the same stuff as ordinary light—but gamma rays are much more powerful. A piece of common cardboard will stop visible light; a gamma ray

Doctor Jones, shielded from gamma rays by nine feet of water in the tank below him, observes the eerie glow produced by cylinders of radioactive cobalt





Irradiation-produced gases in a plastic bar cause it to expand when heated, while the same heat has no effect on an untreated bar of the same material



Slight irradiation causes a rubber band to crack and lose its elasticity (above), while two hours' exposure to gamma rays changes acrylonitrile from a liquid to a dry popcornlike polymer (below)



will go right through it. Gamma rays are more like the X rays that medical laboratories use to photograph the inside of the human body. In fact, gamma rays are identical to those X rays except that they often are more energetic and penetrating than X rays. Some gammas will go through more than a foot of steel before they are stopped.

The cores of some unstable atoms send out gamma rays; they were known long before the discovery of nuclear fission. Certain natural radioactive elements like radium give off gamma rays, and they can also be made in large high-voltage machines such as cyclotrons and Van de Graaff generators. But these sources are puny compared with the tremendous quantities of gamma radiation that have been produced by splitting the uranium atom. Gammas are released not only during the splitting process but are also emitted from the two halves of the split atoms, known as fission products. Although they are generated by nuclear fission, gamma rays contain only a small part of the total energy released in splitting the atom. But since they have a devastating, deadly nature all their own, they have to be reckoned with before the power of the atom can be used. For example, this is an important concern at the Atomic Energy Commission's Knolls Atomic Power Laboratory in Schenectady, N. Y., where scientists and engineers of the General Electric Co. are working together to develop a power reactor for a submarine. In the process of extracting power from the nuclear reactor, thick shields of lead and water have to be set up to protect men and certain materials from gamma-ray damage. Generally, gammas are more of a plague than a help in this business of making atom engines.

In order to find out how gamma rays attack matter around an atomic engine, KAPL scientists have set up two intense-radiation sources. To make these sources, pieces of cobalt metal looking much like ordinary iron were cooked for months inside highly radioactive uranium furnaces, or piles, like those at Oak Ridge and Hanford. In these intense-radiation fields the cobalt became highly radioactive itself and highly charged with deadly gamma rays. Then the cobalt was removed from the pile and put into metal capsules. These loaded capsules are the heart of the gamma-ray sources, and must be shielded to protect the scientists who use them. One of the capsules is a hollow cylinder containing about seven ounces of radioactive cobalt shielded by lead. The other source contains approximately 2½ pounds of cobalt and is made up of 10 separate capsules shielded in a tank of water. It is one of the

largest gamma sources of its kind anywhere. Nearly \$100,000,000 worth of radium, about twice the world's present supply, would be needed to equal the strength of this source—yet the cobalt for this unit cost only about \$17,000.

The lead-shielded source is a strange-looking piece of equipment. This type of shield was first used at Oak Ridge. There's a big lead cylinder that sits on a dolly so that it can move back and forth across the top of an even bigger lead-block base. The whole mass of metal, about 14,000 pounds of it, is mounted on wheels so it can be moved about the laboratory. The gamma-ray source is in the center of the lead cylinder when it is not in use. The source capsule is mounted on a steel rod and moves up and down inside the shield like a hand-driven piston. There are two square holes in the lead base block, one near each end. They are the irradiation cavities where the source is used. You set up an experiment in one of these cavities while the source and cylinder are at the other side of the block. Then you move the source, inside the cylinder, until it is directly over the test setup in the cavity. The irradiation starts when you lower the source from the top cylinder into the cavity by a hand-operated ratchet mechanism. During the irradiation, the source sits in a cup in the cavity and irradiates intensely everything around it. But the hottest spot of all is in the center of the hollow source cylinder. If a man were in a radiation field as intense as that, he would receive a fatal dose in about three seconds.

Around KAPL they call it the "Cobalt Pit." That's the place where the laboratory's biggest cobalt gamma source is lo-

**Irradiation of a liquid mixture of acrylonitrile and styrene produces a solid that breaks its container**



**Many ordinary everyday substances are changed by gamma rays. Irradiated paper discolors and breaks into charred bits**

cated. In the inky blackness of the pit building you can barely see the white curb that borders a 5000-gallon concrete water tank. But from the edge of the pit you become immediately aware of a dull blue glow in the depths below. As your eyes become accustomed to the darkness, the blueness gets bigger and you see the shadows in the water. The blue light surrounds 10 rod-shaped objects about six inches high, set in a circular pattern on a steel plate. These 10 objects are gamma-source capsules containing radioactive cobalt, the source of the uncanny blue light. No electricity is involved here. It's another of the supernatural characteristics of powerful

**Flexible plastics, resistant to heat and corrosive chemicals, break down after exposure to gamma rays**





Ordinary glasses become sunglasses after irradiation (above). The cylinders of irradiated cobalt under nine feet of water in the tank below are as radioactive as \$130,000,000 worth of radium



gamma radiation. Day and night, week after week, the light burns on, fed by this peculiar form of energy. It will be five years before the radiation from this "hot" cobalt dies to half its present intensity.

In the center of the source pattern, where the blue light is brightest, is the battlefield where building materials for atom engines are tested. Here, six-thousand-billion gamma-ray bullets come tearing through each square inch of area every second. Only those materials that survive this inhuman bombardment can be used in many parts of a nuclear engine. Some make the grade easily, many do not. They may instead be transformed into something quite different from the original material. The weird way these changes take place is sheer radiation magic.

But what is the nature of this radiation magic? What forms of matter can take it and what happens to those that can't? Scientists have found that generally the result depends on the kind of atomic building blocks used to make the material, and the way in which these blocks are held together.

The deadly effect of gamma rays on living things is well known from long experience. Man, one of the most complex forms of life, is one of the most vulnerable. Death would begin within a few seconds after exposure to intense gamma radiation, yet there would be no immediate sensation of illness or pain. Within a day or so after the body was pierced by these billions of invisible bullets, however, nausea would begin; later, fatigue and fever would be noticed as well as loss of hair. As the days became weeks, cell destruction would increase and finally death would occur.

But living things are not alone affected. Weird changes take place in the common things around us when they are gamma-irradiated. Ordinary glass objects may turn brown, yellow, gray, blue or other colors; heat them in the oven and their new color fades away. Chemical changes occur in many sol-

ids as well as liquids. A brand-new pair of shoestrings might disintegrate at your touch; paper, even wood, begins to fall apart after extended exposure to high gamma radiation.

Different materials follow their own pattern of radiation degradation, sometimes unpredictably. One family of flexible plastics will become hard and brittle, another softens and exudes gas. Paint blisters, changes hue. A gamma-ray attack on insulation might render electric wiring useless. Explosive hydrogen gas may be released by some materials in decomposing. Rubber, one of the commonest materials used by man, sickens quickly under radiation and an automobile left exposed would shortly be damaged, its antifreeze transformed into a corrosive acid, its gasoline and oil possibly thickened to a syrup. Some liquids turn into solid plastics that burst their own containers, some commercial plastic materials crumble into popcornlike pellets or powder.

Metals alone seem to withstand the assault of gamma radiation, yet metals, too, can be affected when rust forms from contact with caustic chemicals produced from irradiation of other materials.

What happens to food under gamma radiation is still a subject of experiment. Scientists know that the rays would help preserve food by killing all the germs that would bring on decay. However, the radiation might also make the food harmful for human consumption. Possibly it would also render the food unappetizing in color and flavor. So far, animals have been the principal guinea pigs for testing an irradiated diet, but human feeding studies are scheduled for the near future.

Nevertheless, when science has learned more about gamma rays and their power for good and evil, they may be put to very useful service in preservation and sterilization of foods and drugs.

Already gamma rays are being put to use in hospitals for the treatment of cancer; fatal in heavy doses, the rays in proper dosage at the right time and place can save lives. The products from atomic reactors, such as radioactive cobalt, are among the cheapest sources of this lifesaving radiation. They are useful, too, in seeing where



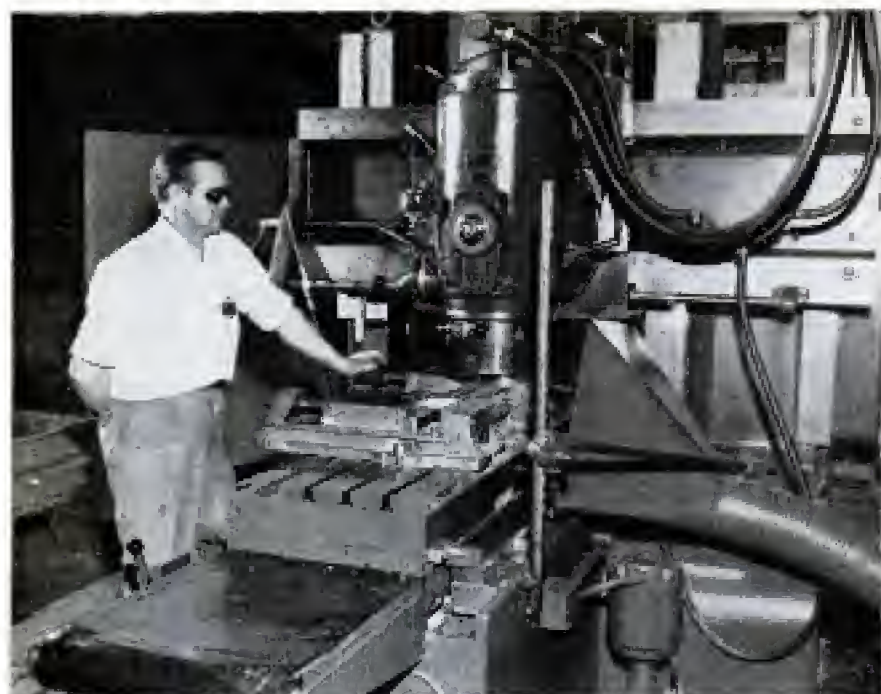
Seven tons of lead shield a piece of irradiated cobalt no bigger than your index finger in this rolling material-testing machine, checked with a radiation counter for possible gamma-ray danger

the human eye cannot penetrate—through thick metals—to discover hidden flaws in castings. Scientists are learning how to produce porous, spongy plastics by the expansion of gas produced inside the material by radiation; the product may prove valuable as insulating material. Conversion of sawdust into food for livestock by irradiation is another potential development.

Eventually gamma rays should prove a very useful servant for mankind. Today they are confined to the laboratory behind danger signs and lead shields. Tomorrow, science will learn to harness this unusual energy to benefit civilization. ★ ★ ★

☛Chemical "extenders" tested by the Department of Agriculture multiply the length of time that sprays containing DDT, aldrin and lindane remain effective.

## High-Speed Milling Machine Cuts Through Aluminum Like Butter



Cutting a four-inch furrow in a 48-inch bar of aluminum in only eight seconds, a high-speed milling machine is setting new records in the aircraft industry. The machine has a table-travel speed of 375 inches per minute, compared with the usual 60 inches per minute of conventional machines. Maximum capacity is reached at 10,700 revolutions per minute. Warpage of the work is eliminated by the cutter design which transfers the intense frictional heat into the chips rather than into the metal being milled.

## Split-Ring Mount Holds Gun Sight

On a new rifle mount for a telescopic sight there are no large screws or "ears" to catch in brush or clothing. The new mount is the split-ring type. The sight is easily slipped on or off without changing the point of impact. Bases are available for side and top mounts. The new accessory for .22-caliber rifles is made for scopes of  $\frac{3}{4}$ , 1 and 1.023-inch diameters. No base is required on some rifles.



## Motor-Bike Driver Lies Down to Race

Wind resistance is reduced to a minimum by a streamlined body that is placed over a German motorcycle. The driver lies on his back and looks ahead through a slanting transparent screen. With such extreme streamlining, the motorcycle, a 50-cubic-centimeter NSU is said to go as fast as a normal 500-cubic-centimeter model. The speed tests were run near Munich, Germany.







## Swiss Salvages Fortune From Wrecked Wartime British Bomber

Considerably more than scrap-metal price has been realized by an enterprising Swiss who raised a British Lancaster bomber from Lake Constance into which it crashed during World War II. Fees paid by sightseers have more than paid original salvage costs. In addition, thousands of

gallons of gasoline in leakproof tanks proved salable, and the advertising value of a waterproof Swiss wristwatch found in the wreckage brought a good price from the maker, who plans to use it for advertising purposes. The plane will remain on display as long as the public is interested.

## Stryker Frame in Plane Protects Airborne Patient

Paraplegics, polio victims and burn cases can be airlifted to hospitals near their homes or flown to distant hospitals if they're encased in a Stryker frame. The frame, used in hospitals for years, protects the patient from injury during bumpy rides and enables him to be turned face up or face down. Paraplegics and burn patients must be moved every two hours. In turning, the patient is sandwiched between two mattresses and turned by releasing a pin in the frame.

## Standardize Nautical Mile

American ships and planes will now use a nautical mile four feet shorter than the one previously used. The international nautical mile, which is 6076.10333 feet, will replace the U. S. nautical mile, which is 6080.12 feet. The change was recently brought about by international agreement.





### Scaled-Down Drilling Rig Prepares Youngsters for Oil Fields

You could hardly expect it to strike oil, but a drilling rig built by Jim Hammond of Artesia, N. Mex., has sent three sons to near-by oil fields as qualified drillers and tool dressers and is well under way in the training of a fourth. The rig is a scaled-down model of the standard cable tooler, which opened most of the nation's shallow oil pools. Every part of the rig, including

the walking beam which pushes and pulls the tools during the drilling, was reproduced in exact detail. Powered by a 2½-horsepower gasoline motor, the rig has a complete set of scaled-down tools, drilling bits and drilling stems. It drills a 2¼-inch hole to 100 feet. The wooden derrick stands 15½ feet, less than one fourth as high as its original counterpart.



### Hot Plate With Oven Broils and Bakes

You can broil or bake foods with a German hot plate that has an oven. A cover is placed over the hot plate when the oven below is to be used. The table-top range has a three-position heat control and can be carried in the car.

### Plane Radio Rings Bell

Simplification of radio procedure for airline pilots is effected by tone decoders to be purchased by United Air Lines. The devices ring a bell in an individual airplane cockpit when ground radio operators wish to contact a flight and the pilot tunes only his own calls.



### Motor Mount Swings Inboard For Ease in Handling

Outboard motors can be swung overboard or inboard with ease on a new pivoting mount. Two brackets are installed on the transom of the boat. The motor mount slips onto pins on these brackets. The motor can be left permanently installed on the mount, with the mount then serving as a convenient way to carry the motor.

### Buoy Locates Downed Airmen

To aid rescuers searching for survivors of aircraft down at sea, the Woods Hole Oceanographic Institution has developed for the Navy a drift buoy capable of transmitting an automatic distress signal to radio direction finders for 60 hours. The floating buoy, released on impact with the water, automatically starts broadcasting on the distress channel upon immersion. It also displays a dye marker and a small incandescent light to enable survivors in rafts to locate it and take it in tow. The buoy is designed to have almost exactly the same rate and direction of drift as standard Navy aircraft rafts.



DECEMBER 1954



### Typewriter Prints Music

Musical scores are printed quickly and legibly by a typing unit with 33 keys. The device contains all the essential characters for music notation, and is expected to be a boon to all composers, arrangers, copyists and music printers. It was invented by Robert Keston of San Francisco, after nine years of work on the project.

### Electric "Bunsen Burner"

Ingenious use of a highly polished, nearly conical mirror to concentrate heat has enabled the German inventor of an electrical "Bunsen burner" to focus as much as 1000 degrees centigrade on a heated object. Shaped rather like the base of an old-fashioned oil lamp, the burner shell, with mirror interior, surrounds a vertical electrical heating unit to throw heat upward through a vent. The inventor claims his heater eliminates the gas fumes and heat loss of the conventional gas burner. It takes only a minute to heat up.



Oil-shale deposits of Colorado, Utah and Wyoming make up one of the world's greatest fuel reserves, containing more than 100,000,000 barrels of petroleum.



Al Mingalone harnessed himself to 30 hydrogen-filled balloons to get an unusual angle shot of a Maine fair. Two rifle shots pierced balloons to bring him down safely 13 miles away

## Oh, for the Life of a Cameraman

**L**IKE MOST photographers, Al Mingalone is always looking for an unusual camera angle. At a fair at Old Orchard Beach in Maine, he decided that an aerial view would be nice, so he tied himself to 30 plastic balloons filled with hydrogen and headed straight up. The experiment worked too well; in no time he had reached an altitude of 600 feet and was still ascending. A local priest sized up the situation, grabbed a rifle and punctured enough balloons to assure Mingalone's safe descent 13 miles from the fair grounds. Hazardous stunts add spice to the lives of cameramen who brave fires, explosions and dangerous vantage points to secure exciting pictures. They prove here that a photographer intent on a good shot cannot be discouraged by daggers or lions. ★ ★ ★

Pickaback photographer, J. S. Scott, rides a skier down Sun Valley slopes and snaps passing scenery



Sannee Gottlieb, assigned to cover tasting of safety device, swings in mid-air after collapse of scaffold





Photographers flee for their lives as flames from bottled-gas field threaten near-by gas-storage tanks



Navy photographer instinctively tries to cover camera with helmet as explosion scatters debris



Some men, like Arthur Sasse of INS, would rather enter a lion's cage than miss a good picture. As his trainer stands by, Simba snarls at the birdie



Dick Sarno braves flying daggers to get target view of circus knife thrower, and hopes that flash-bulb bursts won't effect his accuracy

# Detroit Listening Post



By Leo Donovan

**M**OST OF THE 1955 cars have been unveiled so let's measure the contestants.

At this writing, the horsepower ratings of 13 cars are known. Twelve of them have more horsepower than in 1954. One (the Rambler) has its horsepower unchanged. The average increase in maximum output per car is a whopping 32.1 horsepower.

Although we have no records on this, it is a good bet that these figures represent the biggest jump in automotive history for a single model year. It is also a good bet that such boosts can't happen every year!

Displacements are up also, accounting in many cases for the increased horsepower. The average increase in displacement per engine is 15 cubic inches.

Body-dimension changes are not so drastic, although the trend toward longer cars does continue somewhat. Of the 18 new cars checked, 7 are longer, 4 are shorter, and 7 unchanged. The average increase in length of the 18 cars is 1.3 inches.

Incidentally, an interesting statistic is the total increase in length of these 1955 cars. If all 18 of them were lined up bumper to bumper, they would occupy 24 more inches of street than the same models did last year. What does that mean? Simply that highways will be just a little more crowded again next year.

## Billion-Dollar Investment

What the auto industry offers this year represents the largest investment in new engines and bodies ever presented. Conservative estimates are that more than a billion dollars were spent by the automobile companies for machine tools and equipment to build the 1955 models.

Egged on by the sales departments, the engineers have come up with the increased horsepower the salesmen say the public expects. But some top production men are beginning to sour on this horsepower race.

In fact, conversations with engineers of various companies lead one to suspect that the horsepower ratings have been taken out of their hands almost completely. The

weakness in the whole system is that there is no easy and accurate way for the public to check up on production engines. It is generally agreed that if the engine you get in your new car puts out 85 percent of its advertised horsepower that's about all you can expect. And when you subtract the loss caused by water pump, generator, muffler, air cleaner and other items, the rating drops far below that advertised.

The six-cylinder engine won't be an orphan this year despite the introduction of four new V8 engines. However, the percentage of sixes on the highways is plummeting. Chevrolet, for years the top seller of six-cylinder engines, is now installing V8s in half its production. It expects to increase this percentage later.

## Which Twin Has the V8?

There is no doubt that the V8 is being accepted both by the industry and public. But why? Nobody seems to be certain.

One leading engineer (who is among the three top V8 men in the business and, for that reason, whose identity cannot be disclosed) stated privately that neither he nor any of his staff could consistently detect any difference in the way the V8 model and the six-cylinder model performs.

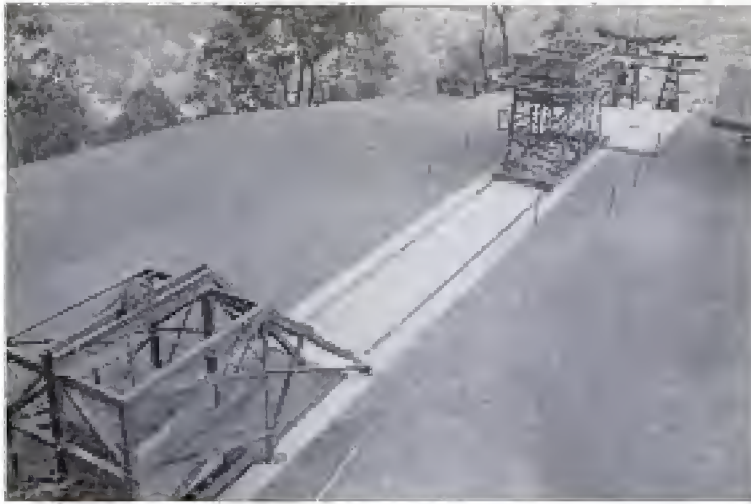
He disclosed that he has put engineers in an unmarked car, let them drive it, and then tell him whether it was powered by the V8 or the six and they couldn't with any regularity. And he is willing to make a wager that the public can't either.

With many cities and some states basing licensing fees on taxable horsepower, the increases in displacement are going to mean it will cost you more to put your new car on the road. In some cities, a Ford V8 license now costs as much as a Cadillac's.

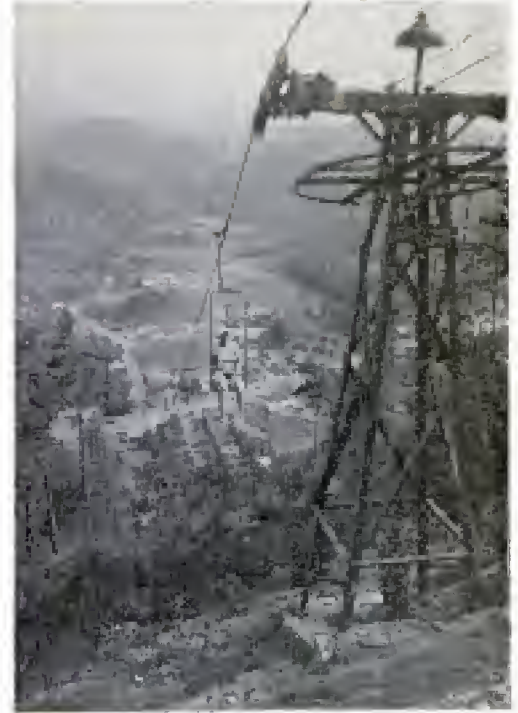
## Late Arrivals

Still to be heard from with 1955 models are Packard, Nash, Hudson, Kaiser and Willys. The last two are on the indefinite list. Packard is expected in January; Nash and Hudson in late January also, although they may be delayed until February. There is a big story in the Nash-Hudson operation as American Motors engineers work out the problem of making two completely different looking automobiles with identical body shells.

Packard will probably lead the horsepower race. It has the advantage of coming out late and can set its figures after all the others are through. Its new V8 engine is the biggest in the industry, displacement-wise. It is conventional in design, a prediction of crystal-ball gazers to the contrary notwithstanding. It's a big, powerful overhead-valve V8 with plenty of iron in the block for future modifications.



Cable anchored by five-ton weight keeps tension on pulley tower



## Tower on Rails Tops Chair Lift

Sightseers instead of skiers ride a new chair lift at Gatlinburg, Tenn., in the Great Smoky Mountains. During its first season the 50-chair lift carried thousands of passengers past a resort-hotel swimming pool, across a sparkling mountain stream and up a pine-covered mountain slope. A large bull wheel, mounted on a tower at the top, serves as a pulley for the line. The tower

rides on a narrow-gauge track and is connected to a cable anchored on a second tower by a suspended concrete block weighing 10,000 pounds. This maintains a constant tension on the line if many or few passengers are being carried.



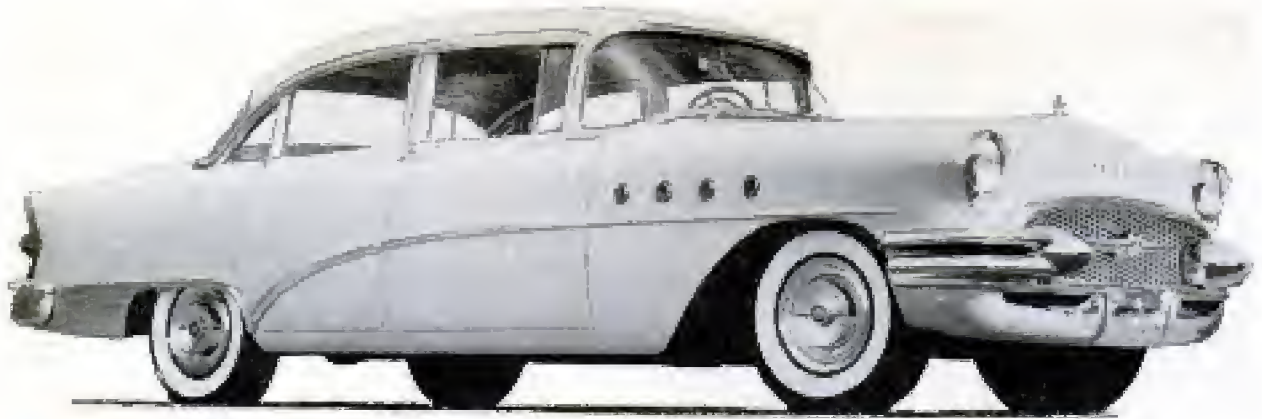
## Homemade Auto For Amputee

William Jewsbury, legless amputee of Fort Scott, Kans., has no trouble getting around now that he has his own private automobile. With the help of a friend, Jewsbury built the tiny vehicle from old automobile and motorcycle parts with a small air-cooled engine for power. A ramp drops down at the rear so Jewsbury can pull his wheelchair aboard. Still in his chair, he starts, drives and stops the tiny car which carries him along at 18 miles per hour.

## Sports Car in Kit

Sold either as a complete unit or in knock-down-kit form, the Grantham Stardust is a new entry in the sports-car field. The Stardust kit is supplied without engine. The assembled unit is powered by an engine specified by the buyer.





Horsepower 188 and 236  
 Displacement: 284.0 and 332.0  
 Over-all length: 208.6 and 215.9

## 1953 Buick

Buick, after an all-new body in 1954, offers a major face lift and considerable mechanical improvements. The front grille is a honeycomb design with huge bumper projections. Rear fenders run straight back without the 1954 step-up styling. Taillights are larger and set in a chrome housing. Horsepower is away up, with all but the Special boasting 236 horsepower. Variable-pitch stator blades on the Dynaflo improve performance about 10 percent. When you floor the accelerator, the blades adjust for top performance; when you release it, they return to an economy setting.



Horsepower: 250 and 270  
 Displacement: 331.0  
 Over-all length: 216.3, 227.3 and 237.1

Cadillac continues its body styling with only minor changes. Most obvious is the shortened vertical stone guard on the rear door. It now runs into a horizontal chrome strip from the front fender. Grille and bumper projections are restyled as are front parking lights. A narrow center post is featured on four-door sedans. Horsepower is up and the new Eldorado sport convertible (which has sharklike tail fins, right, similar to those on the El Camino show car) develops a whopping 270 horsepower. Owners of regular models have to be content with 250 horsepower.







Horsepower: 188 and 250  
 Displacement: 301 and 331  
 Over-all length: 218.6 and 218.3

## 1955 Chrysler

Chrysler has an all-new style for 1955. Its downward-sloping hood and bold grille design emphasize the car's width and lowness. Unusual two-tone paint jobs provide a sporty look. Taillights are slender vertical lines to accent rear-end styling. Other features are wrap-around windshield, dash-mounted shift lever and cockpit-styled instrument panel. The new 188-horsepower Windsor V8 engine uses a modified hemispherical combustion chamber. The New Yorker series develops 250 horsepower.



Horsepower: 185 and 200  
 Displacement: 290.8  
 Over-all length: 217.0 and 216.6

## 1955 DeSoto

DeSoto is also all new for 1955. Both its V8 engines have hemispheric combustion chambers and twin rocker-arm shafts. Both use regular fuel yet develop 185 and 200 horsepower. Also new are flush door handles, "gull wing" dashboard, wrap-around windshield, improved suspension, and a long, sleek hardtop called the Sportsman.





## 1955 Dodge

Horsepower: 120, 175, 182 and 193  
 Displacement: 230.0 and 270.0  
 Over-all length: 212.1

Dodge offers a sleek new styling all its own, unlike previous years when it bore a family resemblance to other Chrysler products. Longer than last year by as much as 16 inches in some models, Dodge has a low, slender look. Power options of up to 193 horsepower are available. There are three engines this year: The six and two V8s (one has a single rocker-arm shaft, the other has two, as did the 1954 engine). The Lancer hardtop sports a three-tone paint job, first in the industry. Other features: Suspended pedals; twin-jet taillights; wrap-around windshield; wider doors.



Horsepower: 120, 162 and 182  
 Displacement: 233.0 and 272.0  
 Over-all length: 198 (approx.)

## 1955 Ford

Ford, too, has a new styling for 1955. Its top line is now the Fairlane (the name of the late Henry Ford's estate). Fairlane models have a sweeping chrome trim from headlight to taillight, dipping abruptly on the front door panel. One hardtop has a chrome arch over the roof from beltline to beltline. Horsepower is now 162 on regular V8 models (last year: 130) and an optional 182 on Fairlane and station wagons at extra cost by addition of dual exhaust, four-barrel carburetors, special intake manifold.





Horsepower: 250  
Displacement: 331.0  
Over-all length: 223.0 and 242.5

## **1955 Imperial**

Chrysler has given the Imperial a distinctive body style for 1955, making it a separate line from Chryslers. A low-production prestige car, the Imperial is immediately identified by twin tail-lights mounted saucily atop rear fenders. Low and long, the car has full wheel cutouts and no protruding hood ornament. All models have 250 horsepower. Crown Imperials (the top line) feature the industry's only disk brakes.



Horsepower: 225  
Displacement: 341.0  
Over-all length: 215.6

## **1955 Lincoln**

Lincoln has a new torque-converter transmission of its own design (it used Hydra-Matic before). It features a low-gear breakaway start. Horsepower is up, and dual exhausts standard. Push-button lubrication system greases car as you drive. You press a button on dashboard and 11 chassis points are instantly greased.





Horsepower: 188 and 198  
Displacement: 302.0  
Over-all length: 208.3

## 1955 Mercury

Mercury has a new top line, the Montclair, 1½ inches lower than other models (which are an inch lower than 1954 bodies). Horsepower is up; four-barrel carburetors standard. Merc-O-Matic is improved for faster starts. Brakes have greater lining area. Like Lincoln, it has push-button lubrication for front end. Touch a button on the dash and grease is forced into 13 chassis points. Reservoir holds a year's supply of grease. It's optional at extra cost.



## 1955 Oldsmobile

Horsepower: 185 and 202  
Displacement: 324.0  
Over-all length: 203.4 and 212.4

Oldsmobile has boosted horsepower to 202 by combustion-chamber modifications, high-lift camshaft, increased compression and larger exhaust valves. Two-barrel carburetor is standard on 88 models, four-barrel on others. Front end is restyled with hooded headlights. The word "Oldsmobile" stands upright in block letters on the front grille. A new side molding continues the flashy two-tone combinations so popular on 1954 Oldsmobiles.





## 1955 Plymouth

Horsepower: 117, 157, 167 and 177  
 Displacement: 230.2, 241.6 and 259.3  
 Over-all length: 203.3

Plymouth has the most radical style change in its history. Over 10 inches longer, it features front fenders that slant forward rakishly. The new overhead-valve V8 has 157 and 167 horsepower and an optional power pack to boost it to 177. The inline six is still available. Other features: Wrap-around windshield; dash-mounted shift lever; reverse-angle taillights; and unusual two-tone paint combinations.

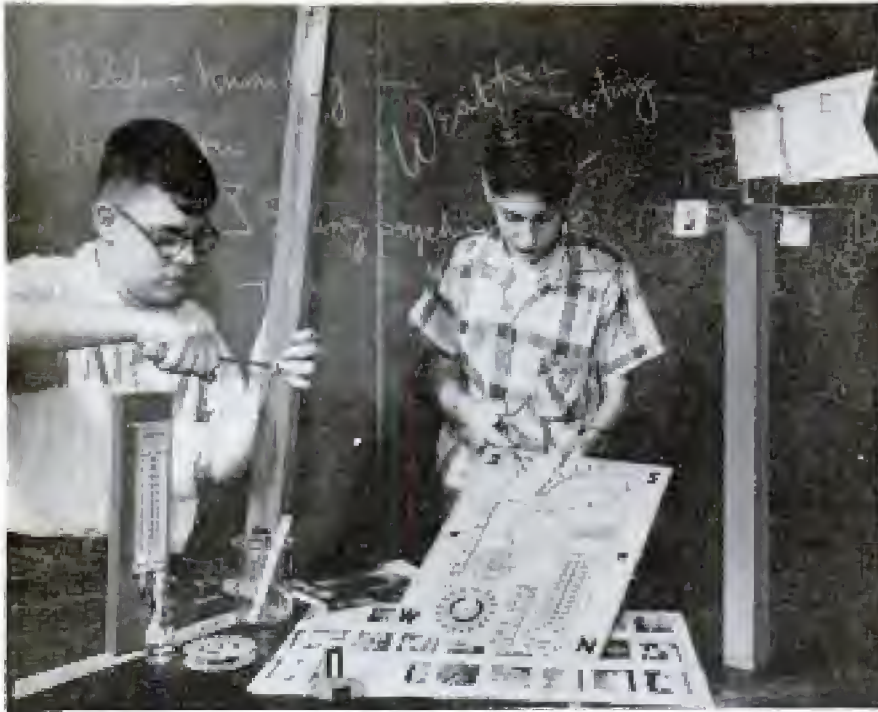


Horsepower: 80  
 Displacement: 195.6  
 Over-all length: 173.3 and 186.3

For the first time since it was brought out, the Rambler is not the Nash Rambler. It is now being sold by both Nash and Hudson dealers as the Rambler. Most important improvement in the 1955 models is a drastically reduced turn-circle diameter made possible by cutting the fender skirts away from the front wheels. Front tread is now slightly wider than the rear. Turn-circle diameter is 36 feet on two-door models, the shortest in the industry and six feet less than on the 1954 Ramblers.



## Kits Teach Youngsters Weather Forecasting, Other Sciences



Youngsters with a scientific bent can teach science to themselves with a new series of hobby kits. With the weather kit, the young scientist can gauge humidity and wind velocity, chart cloud formations and make his own weather forecasts. An electronics kit includes parts for a two-tube radio and a transmitter. With the medical training kit the child learns first aid and hygiene. An optical kit has the parts for building telescopes and microscopes, and a geology kit contains rock samples and tools for collecting specimens.

## Streamlined Sidecar Designed for Racing

Hardly big enough for the passenger's feet, a tiny, streamlined sidecar on a B.M.W. motorcycle offers little more than a toe hold during a race. The motorcycle itself is housed in a completely streamlined enclosure. The function of the passenger is to prevent the cycle from tipping on high-speed turns by leaning inward as much as possible. The winning motorcycle in the sidecar event averaged 93.2 miles per hour at a recent Italian race.



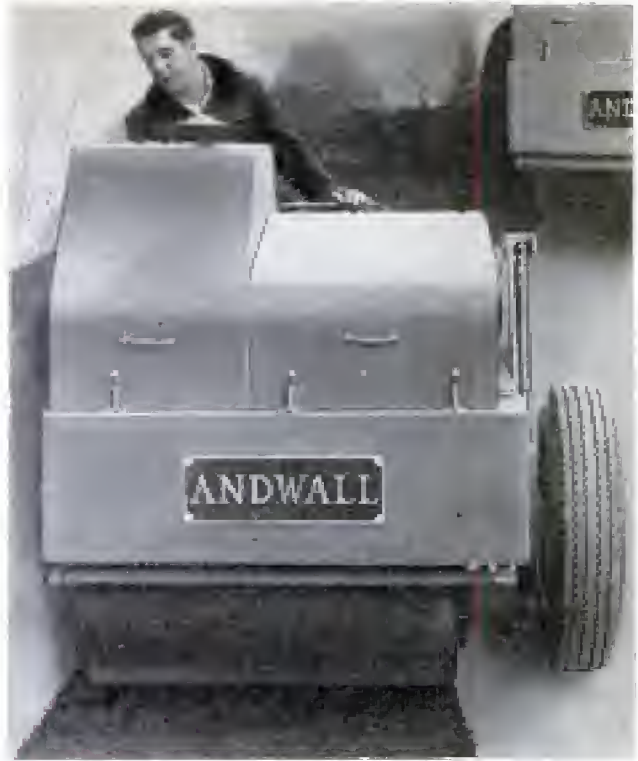
## Mechanical Center For Football Drill

Centers can practice blocking while quarterbacks perfect their ball handling if a centering machine developed by California's San Jose State College football coaching staff is used. The spring-actuated machine delivers the ball to the quarterback just as a center would. It cannot be used by single-wing quarterbacks or punters, as the quarterback must be directly behind the "center" to trigger it by arm pressure.



### Ice-Packed Butter Dispenser Cuts Only One Pat at a Time

Sanitary is the word for a refrigerated butter dispenser that cuts a fresh pat each time one is needed. Chipped ice in the dispenser keeps two pounds of butter at spreading temperature. A trigger at the base of the machine is pressed with the edge of the bread-and-butter plate each time a new pat is wanted. An electric motor starts and the cutting mechanism goes into operation. The machine, designed for restaurants, saves time, labor, prevents waste and minimizes handling of the butter.



### Roller Snuggles Up to Walls

When a new power roller can't get close enough to walls or bridges, the operator simply removes one of the front wheels. With the right wheel removed, the machine needs a clearance of only 1½ inches. Just three bolts are loosened to remove a wheel. The operator can raise or lower the wheels by the flick of a hydraulic lever. The two-ton roller uses liquid ballast.

### Parrots Tour French Zoo in "Rubberneck" Bus

Parrots are privileged characters at the Vincennes Zoo near Paris. They even have their own "rubberneck" bus that is pushed around the grounds by an attendant. The feathered sightseers are a popular attraction





Transpolar flights from Los Angeles to Copenhagen go over some of the world's most inhospitable terrain

## **Modern Vikings Over the Pole**

By Eliot Tozer

**I**N THE THOUSAND YEARS since Leif Ericson set foot on North American soil no man was able to establish a successful trade route through the Northwest Passage until last month. On the 15th of November, Scandinavian Airlines System (SAS), whose pilots and crewmen trace their ancestry back to Ericson and his Viking band, opened a new route across the Northwest Territories from Copenhagen, Denmark, to Los Angeles.

SAS's ships, a far cry from the "long ships" sailed by the Viking Ericson, are four-engined Douglas DC-6Bs that cruise with pressurized comfort at 285 m.p.h.

SAS, like all pioneers, faced some staggering problems in setting up this first scheduled airline operation over the top of the world. And the problems that the two pilots and their seven crewmen face on each and every one of the twice-weekly flights are almost as bad. For these crews of nine specially trained airmen fight a constant battle on three fronts: Weather, communications and navigation.

Strangely enough, the weather, even though most flight plans take the specially equipped aircraft near the North Pole, is the least of the crew's difficulties. In fact, winter weather at cruising altitudes—12,000 feet westbound and 17,000 feet east-

bound—is better over the Pole than it is on the regular North Atlantic run because the route passes through the stable high-pressure area that hovers between eastern Alaska and northern Greenland during the entire year.

As in most such high-pressure systems, visibility is good, cloud cover seldom exceeds 50 percent and there is no turbulence or bumpiness. Ice that forms on wings and tail is almost always soft rime ice, like the frost in a refrigerator, rather than the hard "clear" ice that forms in thunderstorms and cold fronts.

On the ground, however, weather is a major problem. Blowing snow blots out runways in minutes and sometimes causes delays of an hour or more. Ice fog smothers the airport at Churchill, an SAS alternate, for a week at a time. And "wind chill," a combination of cold and wind, sometimes forces SAS to keep its aircraft engines turning over all during the regular route stops at Winnipeg, Canada, and Bluie West 8, a U.S. Air Force base in Greenland.

"Still," says Capt. Mikal Aschim, "starting the engines is not our critical problem. Rather it is preventing the hydraulic lines from freezing."

Communication by radio is a headache first of all because there are so few stations



north of 70 degrees north latitude where SAS does much of its flying. So the airline has built its own ground stations at Churchill, Frobisher Bay and Winnipeg.

But the major communications problem arises about once each month during "ionospheric storms" that crackle through the upper air in the Aurora Zone, a broad belt several hundred miles wide around the North Pole. At such times, all communication except that over very short distances is blacked out completely. The storms, which last about 48 hours, can be predicted by the Ionospheric Forecasting Institute in Washington, D. C., about two days in advance.

Still, SAS's pilots and navigators say that weather and communications difficulties are minor compared to the problem of navigating their 52-ton aircraft across the thousands of miles of churning ice ridges and black arctic seas.

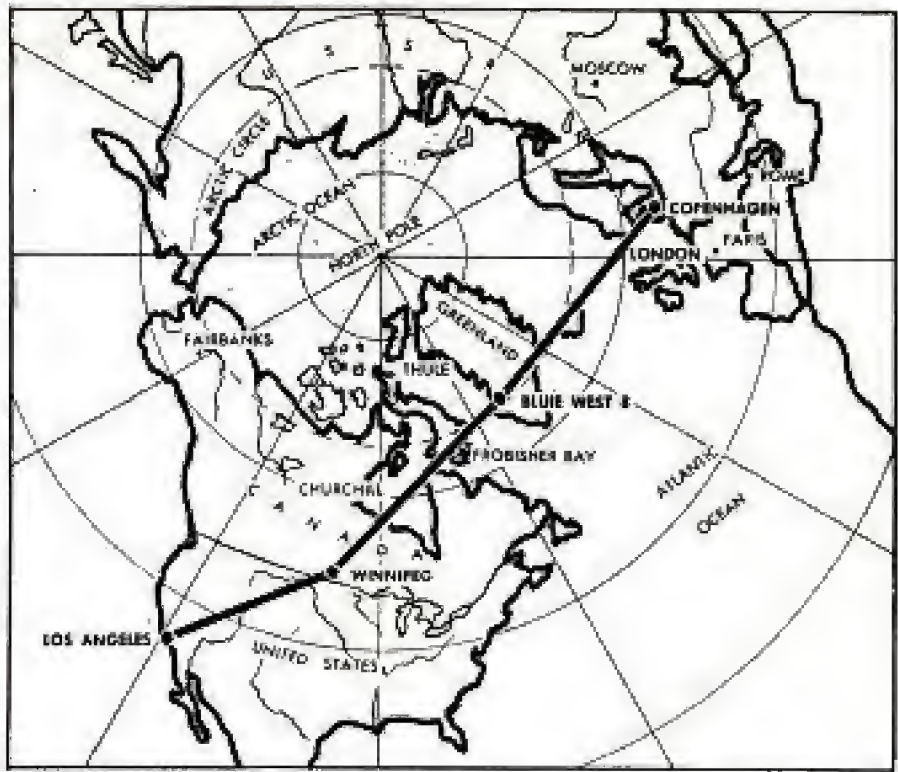
Landmarks are few and darkness blacks out even these during many months of the year, so the navigators of the sleek ships, *Arild Viking* and *Leif Viking*, must depend on chart and compass.

Much of the Arctic is still inadequately mapped and, within 1000 miles of the Magnetic Pole, the magnetic compass is useless. Because the horizontal lines of force of the earth's magnetic field are so weak above 60 degrees north, the needle on the compass whirls crazily.

So the navigator loses all reference to the earth, navigationally speaking, as he approaches the Arctic Circle. In figuring his headings for the three-part 23-hour flight—sometimes in total darkness—he must use a gyrocompass whose accuracy depends upon a tiny wheel spinning at more than 20,000 r.p.m. This Bendix Polar Path compass is so accurate that it "drifts" no more than one degree per hour.

But Polar Path was not the only answer needed. Because the lines of longitude converge at the Pole, SAS had to adopt the new grid-navigation system in which a special grid is laid over the Polar Projection charts—like the chart on the UN flag—with Grid North running along the Greenwich Meridian.

The navigators on SAS's *Royal Viking*



Winnipeg and Blue West 8 are regular stops along the route; Frobisher Bay and Churchill are alternate stops. Thule can be used in an emergency

flights across the Pole also determine their position—as navigators have for 13 centuries—by the stars. During the spring and autumn equinoxes, when the stars are not visible, they take repeated sun shots. And when the sun itself is below the horizon—but there is still daylight—they take sun shots with a polarized sunlight analyzer known as the Pfund Sky Compass.

The navigators, using these special

(Continued to page 260)

The Polar Path compass, utilizing a gyro flywheel spinning at 22,000 r.p.m., determines course when magnetic compasses are useless in polar regions



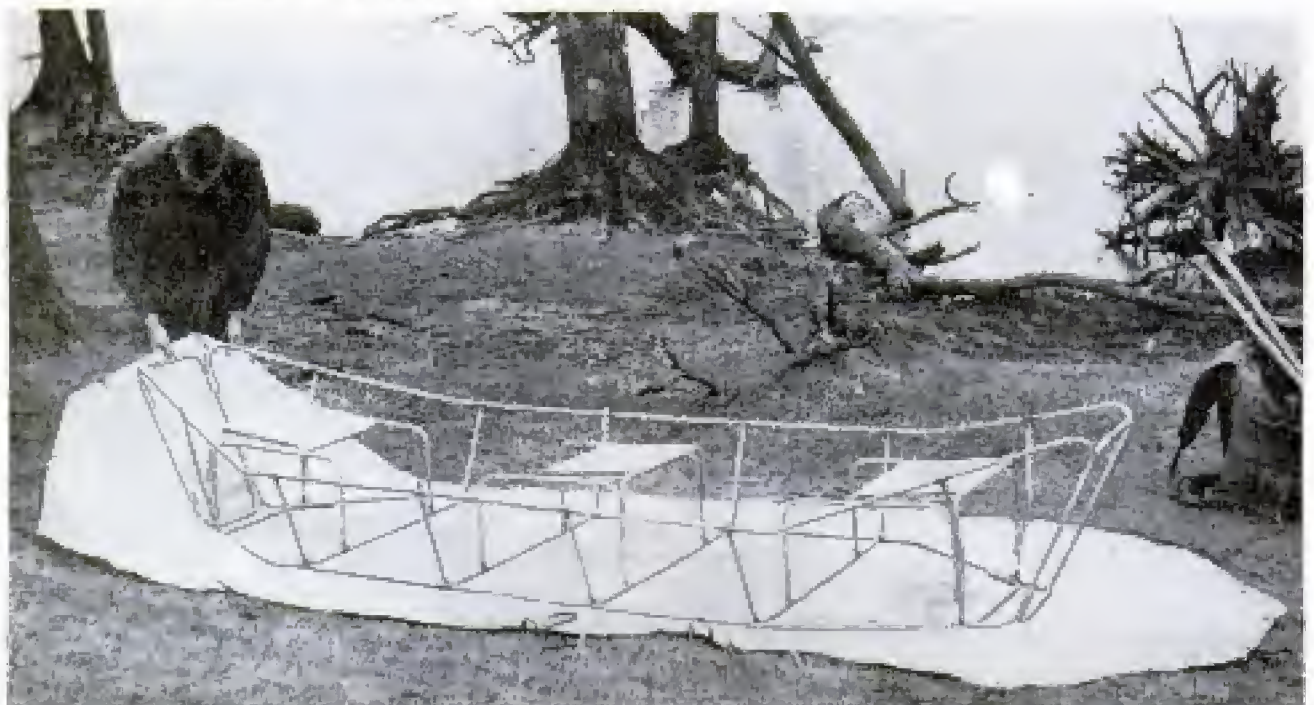


Width and flat bottom of the canvas boat make it hard to upset

## ***Canvas Boat Fits Into Pack***

CANVAS and metal pipes form a lightweight boat that can be knocked down and carried in a back pack. Equipped with three seats and accommodating three people and gear, the assembled boat has a flat bottom and will not readily tip over. It takes only 15 minutes to assemble the boat without tools. The boat consists of heavy, 18-ounce duck impregnated with synthetic rubber stretched over tubular-aluminum framework. The canvas is seamless and presents no problem in folding. The craft requires no maintenance except thorough drying before storage. For occasional patching, a kit is provided, and holes can be repaired as easily as punctures in an inner tube. Two models of the boat are made. One measures 13 feet and weighs 37 pounds. The other is 9 feet long and weighs 36 pounds. Both boats are 44 inches at the beam and measure 14 inches deep at midship.

Disassembled, boat fits into a pack sack for easy portage. Below, it is put together in 15 minutes. Straps lash the canvas to its aluminum-pipe frame





## "Lawn Maker" Sprays Seed, Fertilizer and Water on Embankment

More than two acres of embankment per hour is seeded, watered and fertilized with a unit owned by the New Jersey Turnpike Authority. The truck-mounted "lawn maker" moves slowly along the shoulder of the turnpike while an operator directs a fine, even spray upon the near-by slope. Limestone and commercial fertilizer are mixed with the water in a 1000-gallon tank which has an agitator resembling a lawnmower reel. A reversible series of narrow

knives scrapes the inside of the tank to prevent the formation of sludge. In the conventional "flosser," as the machine is called, limestone often forms a sludge on the bottom of the tank which crushes gears, cracks shafts and breaks off agitating vanes. An auxiliary tank permits the application of just seed and water or fertilizer and water. The unit replaces conventional seeders, which cannot operate on all slopes, and hand-seeding, which is expensive.

## Plastic Plants Made With Kit

Simulated plants can be made of plastic by the amateur equipped with a new kit. The realistic plants duplicate the translucent, flexible nature of the real articles, are not easily damaged and resist flame. A kit includes directions for making one of five different plants, a can of colored plastic (enough for five or six plants), an aluminum leaf mold, wire stem, wire to support the leaves and wax tape for binding stem to leaves. The liquid plastic is ladled into the mold which is placed in a hot kitchen oven for one minute. The baked leaf is stripped from the mold and attached with others to the stem. A plant can be completed in minutes.





Even seals are on wheels. This performer swims in his private tank inside the truck on cross-country tours

# EVERYTHING'S

**W**ESTERN MOVIES made the itinerant peddler famous—he and his wagon of pots, pans, socks and other essentials were standard fixtures of the wild-west plot, and still are. But he is different now. He is motorized and specialized. Once successful because of the wide-open spaces, he is now in demand for the opposite reason—traffic congestion. Mrs. America

doesn't like to haul the kids downtown through traffic, to drive block after block in search of a parking space, just to buy a pair of shoes. Today, the shoe store drives up, parks in the driveway and the family is outfitted in minutes. Mother likes it, the kids like it and, most of all, the shoe man likes it. On these six pages are examples of how everything's on wheels today.

Equipped to handle any wiring job, a mobile electrical shop in Iowa gets its work orders via radiotelephone

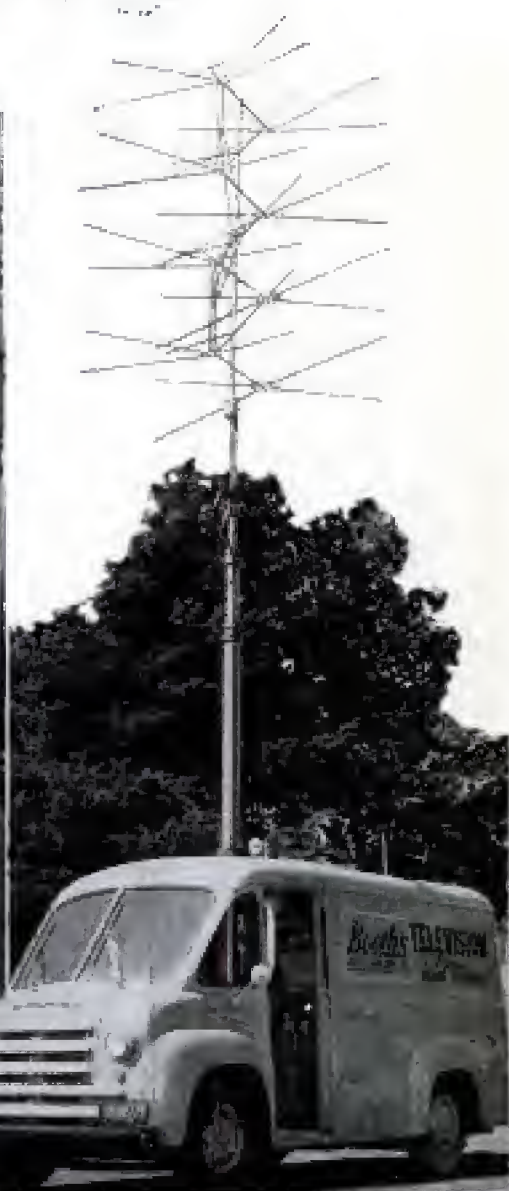




All sections of big cities as well as scattered settlements in rural areas are served by mobile libraries

# ON WHEELS

TV sets are repaired and antenna installations tested right on the site with this electronics lab built inside a Dodge truck

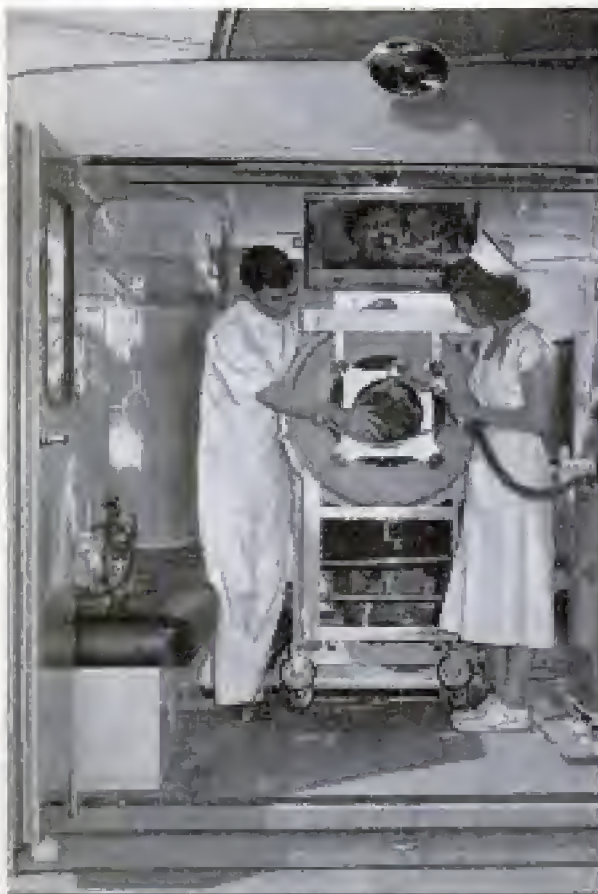




Children wear out a lot of shoes and buying new ones is mighty convenient when the shoe store drives up and parks in your driveway



Iron-lung patients are moved in a specially equipped truck that has all the required hospital facilities built into it. Right, another walk-in van has a full set of office equipment for on-the-spot demonstrations





In an air-conditioned, fireproof trailer is a mobile art museum that brings fine paintings to Virginia schools



By parking two big trucks, each with expanding walls, alongside each other and coupling them as shown below, this company hauls its own mobile auditorium seating 100 persons anywhere in the country for sales meetings





California shipyard workers get hot meals served from a cafeteria in a truck. Prepared foods are kept hot by electricity. The truck also has a grill and refrigerators

Women don't go downtown to look at wallpaper now. They look over samples inside a mobile decorator's shop







Salesmen, like this sporting-goods man, can drive up with a complete display and park outside a dealer's store

What woman could resist when a salesman drives up in his appliance truck, right, and offers to do her laundry? A washer, drier and ironer do the work. He makes the sale



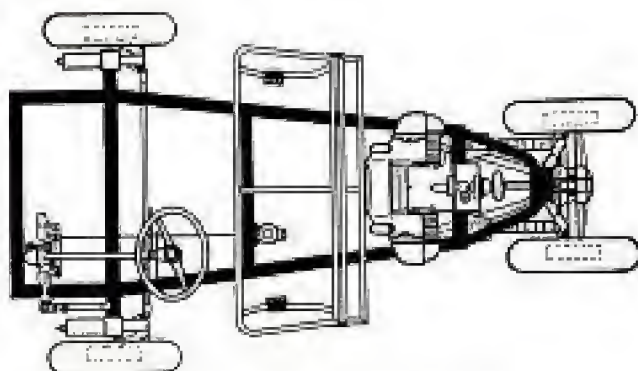
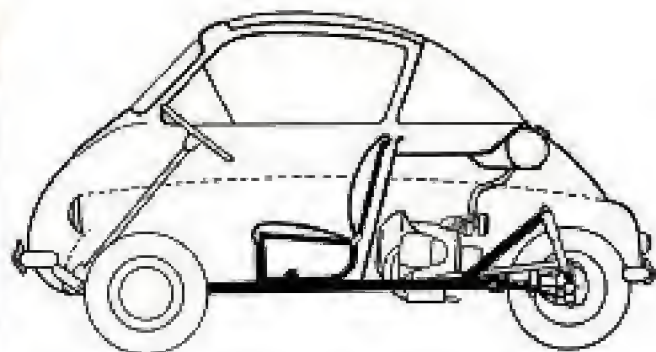
And the baker rolls now, below. Hot rolls are sold at your doorstep from the truck





### German Four-Wheel "Scooter"

Just the right size for a housewife to use in shopping or for the commuter to take to the station, a tiny, German two-seater has a completely enclosed, weatherproof body. The two-cylinder rear engine drives the car 40 miles on a gallon of gasoline. Tread at the rear is about one half that of the front.



### Design Paint Peels Off Glass

Christmas designs painted on glass with a new plastic-base paint peel off in one piece when it's time to remove them. Patterns to be followed are taped on the other side of the window that is being decorated. Besides the Christmas paint kit, which contains patterns for holly leaves, snowflakes, Christmas trees and snowmen, a Halloween kit and a children's everyday kit are available. Decorations can be pulled off glass surfaces within five minutes after they are applied. No scraping is necessary.

### Needle Ties Rag-Strip Ends For Home Rugmaking

People who make their own rag rugs are helped by a simple "knotting" needle used to join the rag strips. Two strips to be joined are pushed down over the needle and the end of one of the strips is shoved through the needle's eye. When the rag strips are pulled off, the strip in the eye is passed through the slit in the center of each strip, joining the strips permanently. The device eliminates the usual need for sewing the strip ends.





Small station along route is complete to baggage trucks and stationmaster. Coal in background is genuine

# MODEL RAILROAD *With Sound Effects*

By Thomas E. Stimson, Jr.

**T**OLUCA LINES' Number 17 now arriving on Track Four! Tiara & Tidewater Excursion Special departing on Track Two in five minutes. All abo-o-board!"

There was a realistic screech of wheel brakes as Toluca Lines' streamlined Number 17 came to a stop in front of the passen-

ger station, together with a sharp hiss of steam from its heavy mountain-type locomotive. Less than a minute later (five minutes on the system's geared 6-to-1 clock) the Tiara & Tidewater Special pulled out, its departure marked by the clicking of wheels on the switch points and

Taylor's collection of hand-built engines includes wood burners as well as modern diesels. Models of old and new trains run on the same tracks





Realistic stores line the railroad siding. Subdued organ music issues from white church beside railroad trestle

with the chuffing of its tiny exhaust stack.

In the next 10 minutes (one hour on the clock) the Special skirted a headland overlooking the Pacific, made the long circuitous climb up the Tehachapi Loop into the mountains, passed some slow freights on other tracks, whistled for the crossings at Grand Junction and Virginia City and ran through some busy industrial areas. By the time it returned to the union station at Toluca it had traveled a distance equal to 12 miles of actual railroad.

By that time, too, evening was coming on and the clouds that were moving across Monterey Bay had taken on a sunset tint. Lights appeared inside the railroad stations as darkness descended, as well as in the drug store and the other buildings along the tracks. Train lights and locomotive headlights began to shine from the trains that were under way or standing at the stations.

The Tiara & Tidewater, along with the

Cedar Valley Railroad, the Toluca Northern and the Prickly Ridge & Pacific, is an affiliate of Toluca Lines, the big central system that is located in the basement of Chet Tayloe's home in North Hollywood, Calif.

Daytimes, Tayloe is manager of a branch of the Security-First National Bank; in the evenings he and his friends operate a model-railroad system that in realism and complexity compares with an actual full-scale railroad system.

Tayloe is "president" of Toluca Lines, M. D. Swerdfeger (a dispatcher for Los Angeles Metropolitan Coach Lines) operates the Tiara & Tidewater, while E. S. Hammack, a commercial artist, is president and general manager of the Prickly Ridge & Pacific. The companies have interlocking directorates, issue complimentary tickets and passes, and the officials use special railroad stationery for writing to each other.

To provide the space he needed for the



joint railroad system Taylor had to remove 60 truck-loads of dirt from under his home, then build new foundations to support the house. The model layout is 65 feet long and 25 feet wide and there is a sunken walkway along its center from which all parts of the layout may be reached. The system is actually two systems in one, there being some 1200 feet of "O" gauge ( $\frac{1}{8}$  inch to the foot) and 800 feet of "O" narrow-gauge track.

Two months ago the final "mile" of narrow-gauge track was completed and the occasion was fittingly noted by a "golden spike" ceremony attended by model railroaders of the neighborhood, including Dick Wessel, television star who helped build some of the background scenery, and by A. D. Jack Scott, paint-store manager who installed some of the narrow-gauge trackage.

Taylor has been working on the layout for three years (it's the seventh he has built) and expects to finish it in another year. During the last few months he and his two sons have been completing the sound system and the lighting effects so that he can offer new surprises to model-railroading friends who will visit him during the Christmas holidays.

For some of his sound effects Taylor carried a tape recorder to the Los Angeles railroad yards and recorded typical train and locomotive noises. For sounds of a train in the distance he drove into the mountains and picked up the whistle of a train coming around a curve, complete with echoes. For the announcements of arrivals and departures at the Toluca station he recorded the voice of a train announcer who called the names of trains used on the miniature system. Other sound effects include the hooting of a boat's whistle in Monterey Bay and the noisy activities of a saw-mill. Loud speakers concealed in different parts of the layout bring these sounds realistically to listeners' ears. Parts of a sermon, choir singing and subdued organ music issue from a speaker concealed inside a white church that stands on a diminutive hill overlooking the Toluca business section.

Lighting effects, including the cloud projector, are controlled from one of the main operating panels. Here the main overhead basement lighting may be dimmed and turned off to simulate evening and night, at the same time that



Weathered boathouse held by Taylor has faded advertising posters tacked to sides and half-finished boat with shavings

Part of trackage runs right across the top of the main control panel. Panel controls trains, lighting, cloud and sound effects





One curve of the railroad fronts on the "ocean." This is the site of fish cannery nearing completion

lights in buildings and trains are turned on. The lights on trains that are standing dead at the stations are operated by a special high-frequency circuit through the tracks with no interference with the regular circuit that supplies the current to the locomotive motors.

Train operation is "two-cab block control," meaning that two men may each operate his own train on the main lines in any

Cattle pen with whitewashed rails and loading dock holds a pair of toy cows awaiting rail shipment



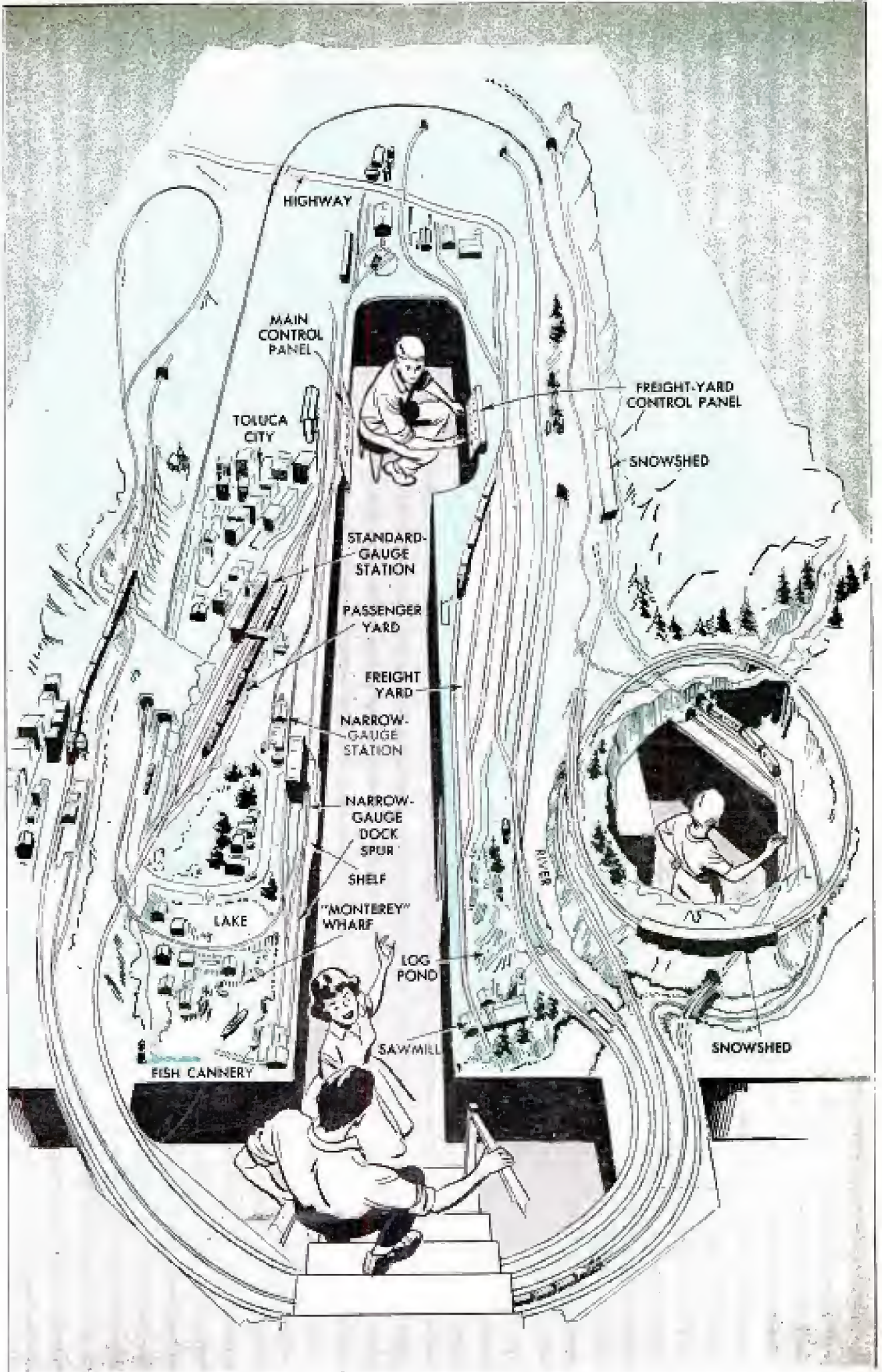
direction without danger of a collision. A similar control panel allows simultaneous operation of two trains on the narrow-gauge portion of the system. And, in the large freight yards, two men may each make up their own freight trains preparatory to moving them out onto the main line.

Rolling stock includes 30 locomotives and 125 cars, all hand-built to scale and using a minimum of stock model parts. The principal trains include a copy of the Southern Pacific "Daylight" passenger train that is operated behind either a steam locomotive or a diesel, a typical "Overnight Express" with a steam engine built from sheet metal, brass tubing, wood and other materials, and an old-time Virginia & Truckee steam engine with two wooden passenger cars. This last train was built by Swerdfeger, who also operates the narrow-gauge "San Juan Express," a scale copy of the D&RGW train that used to operate between Alamosa and Durango in Colorado. The model was built, in fact, after Swerdfeger and Tayloe rode that train before the line was abandoned. The original engine itself is now on exhibition at Knott's Berry Farm some 40 miles from Tayloe's home.

(Continued to page 228)



Drawing shows complete layout of basement railroad





Entrance to Frontierland in fabulous Disneyland will be through stockade-type gates of an old fort

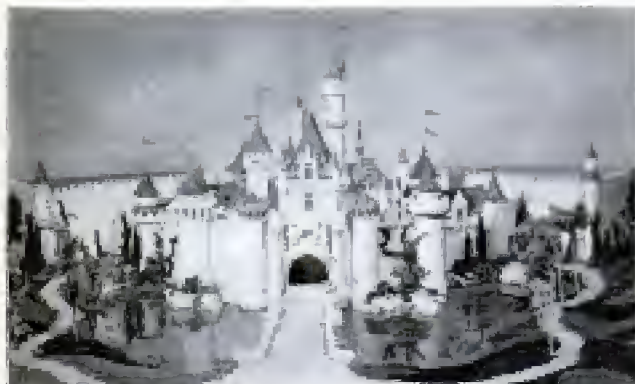
## FAIRYLAND OF YESTERDAY

**F**ORTY PASSENGERS at a time will get a realistic impression of space travel in a huge moon rocket being built near Los Angeles as part of Walt Disney's \$9,000,000 Disneyland recreation park.

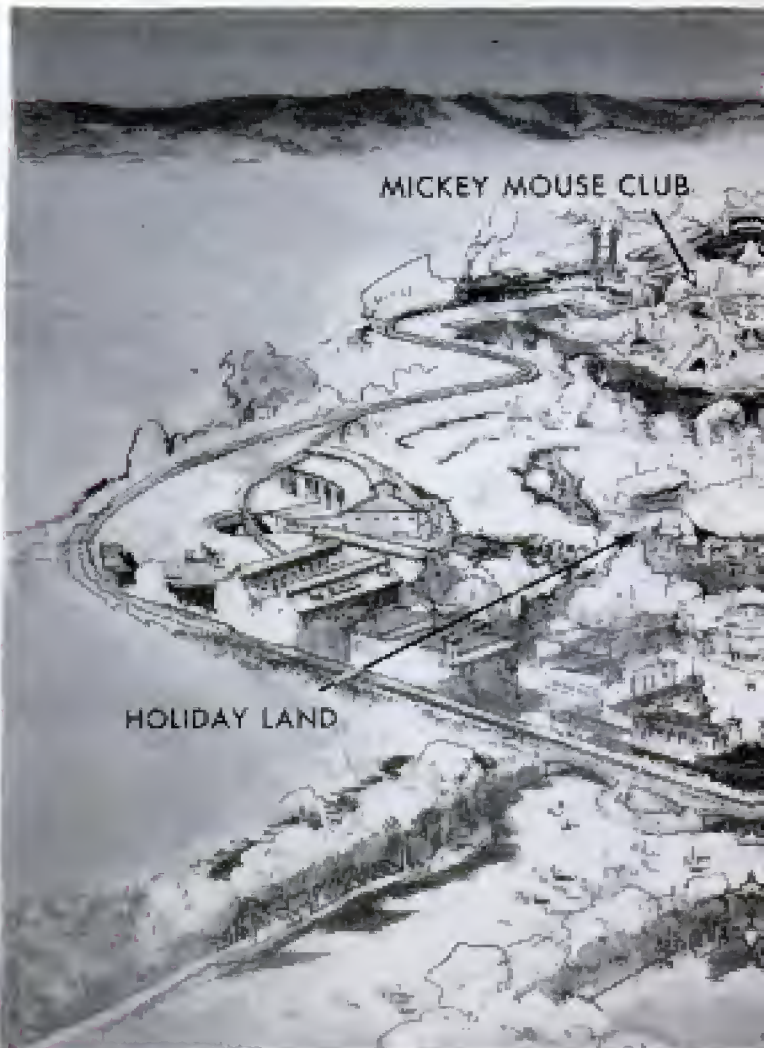
Strapped to their seats, the passengers will thrill at the vibration and roar of the simulated take-off, listen to the staccato

commands of the rocket captain over the intercom, watch the earth recede below them through a huge viewing port in the rocket's chamber floor and will even experience the sensation of weightlessness in midspace—all without leaving the ground.

Near the Tomorrowland area in which the rocket is located, visitors will find an



Above, model of the castle being built in Fantasy Land. It will be 80 feet high. Below, models of the 105-foot sternwheeler and old train for the park







Tomorrowland will offer rides on monorail cars and a stationary rocket ship for simulated trips to the moon

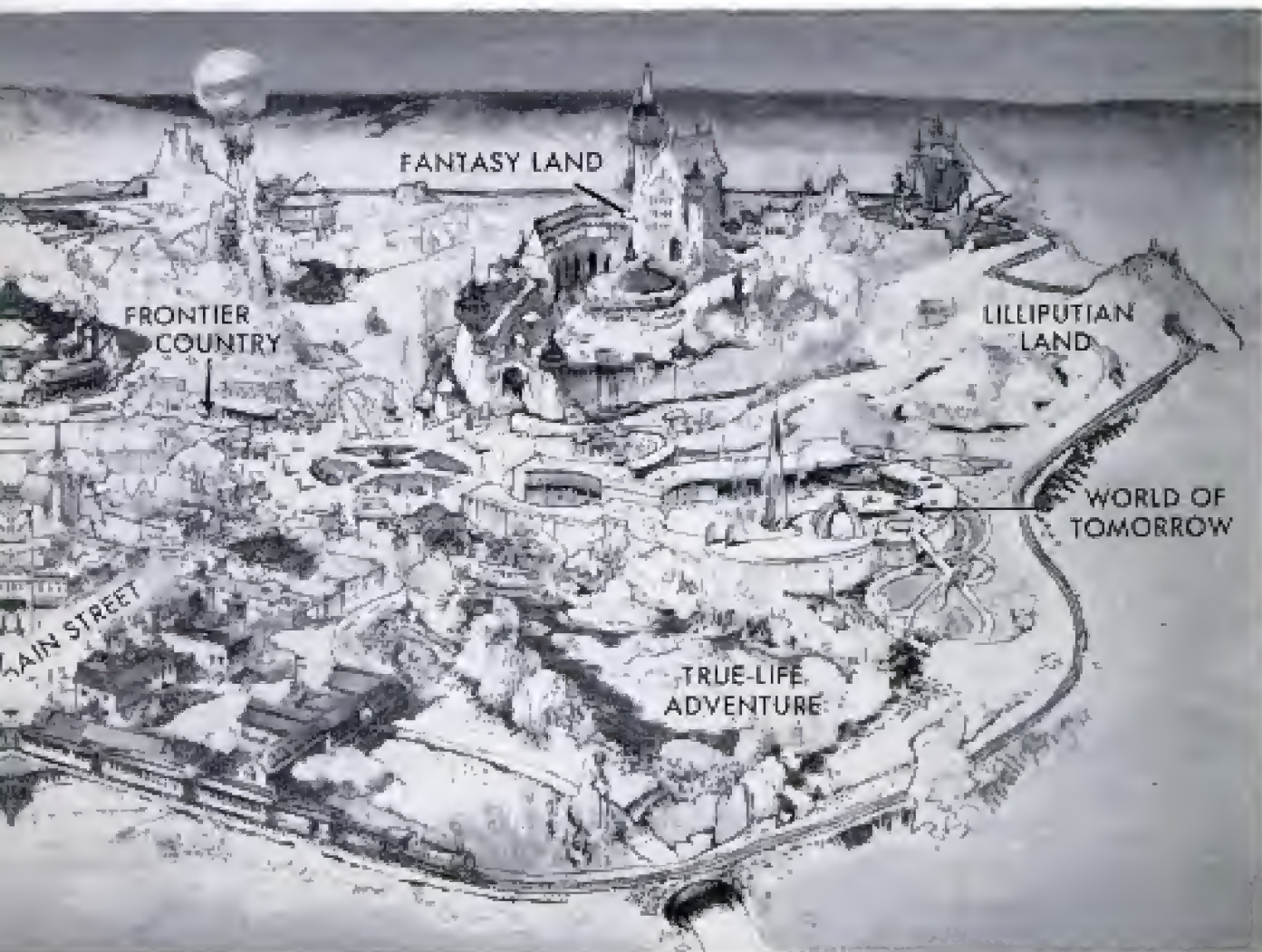
## AND TOMORROW

authentic Frontierland complete with Indians and frontiersmen. Here they may shoot muskets at painted buffalo and other game targets or board a 105-foot stern-wheeler for a cruise past replicas of famous landmarks. In other areas they may ride an explorer's boat through tropical

settings, visit a diamond mine or full-scale sets of Disney motion pictures, or ride on Dumbo the Flying Elephant.

Including picnic areas and the storybook castles of Fantasy Land, the project occupies 160 acres. Parking for 10,000 cars will be provided. ★ ★ ★

The wonders of Disneyland cover 160 acres at Anaheim, Calif., and will be open for inspection next May





## Boy-Size Trailer Built for Junior

Eyes pop and traffic stops in Flint, Mich., when seven-year-old Billy Rucker takes to the road with his "house on wheels." A specially made present from his father, a trailer-company official, it's only 32 inches wide and 40 inches high. Billy pulls it around with a battery-powered small-size tractor.

## Game-Bird "Guzzler"

Plastic "guzzlers" catch rainwater to quench the thirst of upland game birds in California. Made of laminated plastic, the guzzlers are easy to transport and install, and appear to be leakproof. The sloping end of the guzzler serves as an apron for catching rainwater and as an entrance for the thirsty birds.



## First Nuclear Submarine "Hears" Through Rubber Panels Set Into Hull

Built into the steel skin of the *Nautilus*, first nuclear-powered submarine, are rubber panels through which the submarine "hears." The panels will withstand the same pressures as the hull. They house sonar gear which is used to detect other

vessels by sound signals. The special rubber, developed by Goodrich, permits undistorted passage of the signals. Sound travels through the panels in about the same way it travels through sea water. The panels are installed at both bow and stern.



## Fire-Fighting Trailer Battles Blaze Until Fire Trucks Arrive

"First aid" for fires on the Dryden Poultry Farm at Modesto, Calif., is supplied by a special trailer that is hitched to an auto and sped to the blaze. It contains "wet water" supplied under pressure, 75 feet of hose connected to the trailer tank and 125 feet of hose that can be connected to a ranch hydrant. Two portable fire extinguishers, wrenches, reducers and other equipment are carried. The outfit combats fires only until fire trucks arrive.



## Wooden Wings Fail "Bat Man"

Men can flap through the air like birds if they're equipped with the proper artificial wings, believes Frenchman Leo Valentin. He recently tried to prove his theory with a pair of wings made of lightweight wood strapped to his body. Dropped from a plane flying at 10,000 feet, he soon saw his error and opened a parachute he'd thoughtfully brought along. Valentin has tried out many types of wings in the past, with no success.



## Jet Sports Plane Is Tailless

Jet powered and tailless, a French sports plane has a top speed just over 310 miles per hour. The Payen PA-49 is 17 feet long, has a 15-foot wingspan and weighs only 1400 pounds.

Chemists of Gulf Research and Development Co., Pittsburgh, report that addition of a small amount of a colorless gas, boron trifluoride, to gasoline reduces deposits in automobile engines.





Gaskins prepares to cut knee in Fisheating Creek Swamp, Florida. Knees must be carefully selected

## *Knee Deep in Cypress Knees*

**T**O MOST PEOPLE cypress knees — those odd-shaped growths of wood that extend upward above the swamp water from the spreading roots of the bald cypress — are just another curiosity. Cypress-swamp visitors, along with forestry experts, wonder just what they are. To Tom Gaskins of Florida's Fisheating Creek Swamp they are bread and butter. They make his living.

For 20 years Gaskins has been cutting, peeling and drying cypress knees for the market, and for the past decade he has been making it pay.

Cypress knees grow in fantastic shapes, and Gaskins has discovered that they can be made to grow in even more fantastic shapes with a little encouragement. If they have to force themselves around a foreign object such as a bottle or an arrowhead they very obligingly assume even more grotesque formations.

The decorative value of the queer configurations assumed by cypress knees is what Gaskins sells. The knees, like driftwood, are nature's "objets d'art," and Gaskins considers them as such.

Some craftsmen make the knees into lamps and vases. Tom did once, but lately he has been satisfied to sell them in much the same form as they appear in nature.



At left a knee that grew in four prongs. Next, one that surrounded an arrowhead. Gaskins says two at right resemble gossiping women



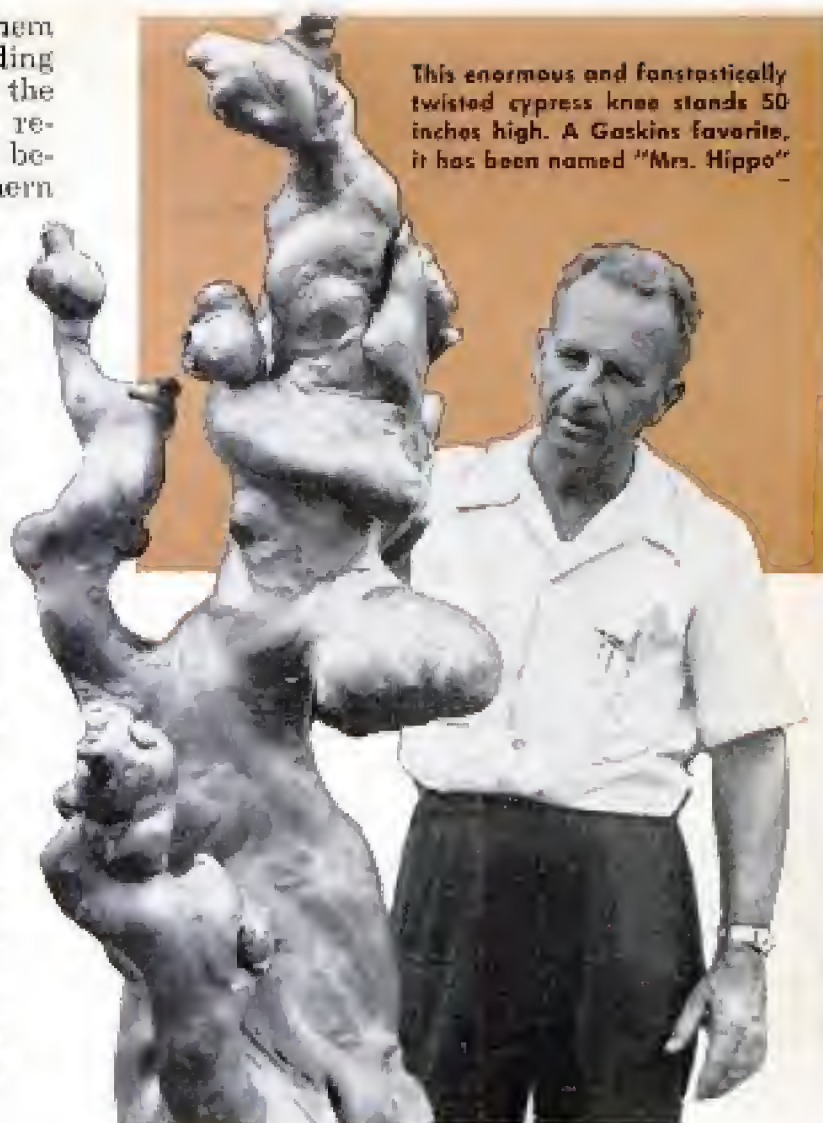
There is a lot more to getting them ready for market than just wading out into the knee-deep waters of the swamp and cutting knees. They require long and careful processing before they are ready to grace a southern curio shop and, possibly, your living room.

After they are cut, the knees must first be peeled, a process Gaskins worked out with the aid of the Agriculture Department's Forest Service. The bark comes off straight surfaces easily, but for years Gaskins was stumped by the bits remaining in the crevices of the wood. He tried oil and lye and acid, and still finished up with kindling wood. Then the Forest Service suggested boiling, and the intricate bark design loosened up enough for Gaskins to work it loose with the tiny tools dentists usually use to work on your teeth.

After they are peeled, the roots must be dried for a year. The warm Florida sun turns them to a honey tan that is the envy of many a two-week vacationist. But during the process they cannot get wet, so Gaskins must keep a continual eye on the weather, ready to wheel his homemade carts loaded with drying knees to shelter at the first hint of a tropical rainstorm.

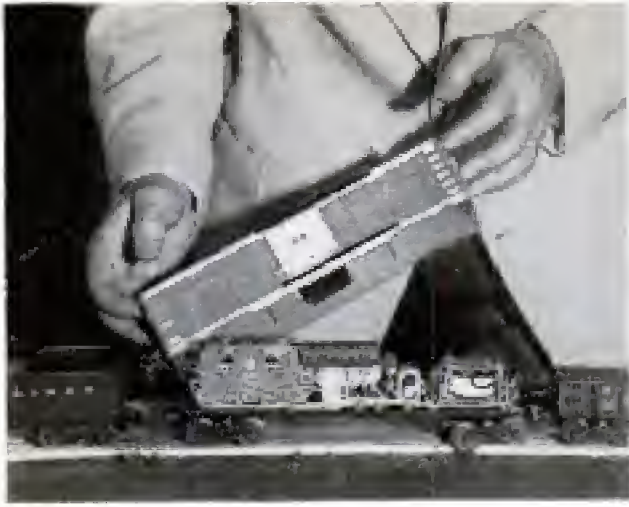
In addition, the cypress knees tend to split and dry unevenly unless they also get air in their centers. To achieve this Gaskins worked out his own oversize power drill that cuts holes in each knee. The holes also provide convenient apertures for the pegs of the drying racks. ★ ★ ★

Politics in cypress. The elephant and the donkey, below. The knee, next right, is called "Woman Dancing With a Two-Headed Monster." Far right, a "Madonna and Child"



This enormous and fanstastically twisted cypress knee stands 50 inches high. A Gaskins favorite, it has been named "Mrs. Hippo"





### Radiation Controls Model Train Equipped With Geiger Tubes

Any radioactive material will control the model electric train of Garth Driver, an instrument engineer at Richland, Wash. The train is a standard model, but Driver has mounted Geiger tubes inside the engine and caboose, and built transistor amplifiers and switching gear into a freight car in the center of the train. By holding a cardboard disk containing radioactive cobalt in front of the train, Driver can make it back up. A disk held near the caboose makes it go forward, and when



Driver holds disks near both ends the train stops completely. Impulses received by the Geiger tubes are transmitted to the amplifiers and switch gear to determine the direction the train will run.

### Auto Transport Uses Special Alloys to Reduce Weight 8000 Pounds

Lightweight metals and alloys are used in a new automobile-transport truck that weighs 8000 pounds less than the conventional models. Aluminum and light steel alloys replace heavier metals in runways, skids, fenders, wheels and trailer body, re-

ducing weight by three tons. This permits the elimination of a third axle on the unit, saving another ton. According to the developers, the machined-aluminum wheels stay in perfect balance, allowing tires a 100,000-mile run before recapping.



## Automobile-Engine Exhaust Safely Inflates German Mattress

It takes only 40 seconds for the sleepy motorist to inflate an air mattress with the help of the engine exhaust. One end of a flexible tube fits over the tailpipe and the other over the intake valve of the mattress. To prevent permanent "sleep" from occurring, a special filter in the tube is said to absorb the lethal components of the exhaust gases. The device is made by a company in Munich, Germany. It is not necessary for the user to turn off the automobile engine to connect or disconnect the unit to the exhaust pipe.

## Flash Synchronizer Has Built-In Tester

Built into the back of the synchronizer housing, a tiny indicator light (see arrow) prevents wasted film due to bad bulbs and inadequately charged units. When ready to take a shot, the photographer simply flicks the indicating light upward with his finger. The light flashes on to indicate sufficient charge and a good bulb. The lamp is part of a new line of flash units which can be custom-fitted to any camera equipped with built-in synchronization. A direct-reading exposure calculator is mounted on the back.



DECEMBER 1954



## Camera Case Permits Underwater Shots

Underwater photographs can be taken with a Rolleiflex equipped with an underwater casing. The unit permits normal camera operations, including focusing, selecting shutter speeds, lens setting and change of filters. It also mounts a flash. A rubber-covered cord makes handling safe and easy.

## Zoomar TV Lens for Movie Camera

Adapted from the lens made famous by television, a movie-camera Zoomar lens provides the photographer with everything from normal focal length, to telephoto, to wide angle, all in one lens. All you do is push the zoom lever (located below the lens) forward to come in, pull it back to come out of the scene. The lens is available for all 16-mm. cameras and no alterations are required.



125



## Aluminum Garage Door Is Made With Build-It-Yourself Kit

You can assemble a new aluminum garage door in 45 minutes with only a screwdriver and a pair of pliers. The door is marketed in a build-it-yourself kit that weighs only 42 pounds. Matched color markings guide the homeowner in assembling

the door. The kit includes the door panels, locking handle, weatherstripping and pull rope. The door is available in two sizes, eight feet by seven feet and nine feet by seven feet, and with either a track or jamb-type operating mechanism.



## Tiny British Jet Flies 600 M.P.H.

Recent British entrant in the lightweight fighter race is the Folland Midge, a development aircraft about half the size of the largest fighters. Despite jet thrust of only 1640 pounds, the 4500-pound, 20-foot wingspan Midge has been clocked at speeds in excess of 600 miles per hour.

## Dolly Lifts Wreck And Tows It Away

Any passenger car becomes a tow truck for disabled vehicles with a new car dolly. The dolly consists of a lever with a movable fulcrum mounted on two pairs of dual wheels. It is backed up to the disabled vehicle and its wheels are locked. As the towing car moves forward, the dolly lifts itself and the wreck into traveling position. No pumping is required.







### Compact Camping Trailer Uses Cadillac Fenders

YOU MIGHT THINK you're seeing double when C. W. Younkens of Burbank, Calif., drives past pulling his camp trailer. The trailer is formed of two Cadillac rear fenders that match those on Younkens' automobile. It is painted to match his car. At the camping site, the trailer opens up to form a 12 by 14-foot canvas-covered room. Inside the trailer itself are storage cabinets, a three-burner butane stove with oven, a sink with a 12-gallon water supply and an icebox. Two persons can sleep inside the trailer and five more in the canvas-floored area around the trailer. Younkens made the trailer for his own use and says that similar trailers could be made with Lincoln, Buick or Oldsmobile fenders. Total weight of the unit, including



the big canvas tent, is about 1400 pounds. It takes about 35 minutes to set it up at the camp site. The trailer has the same width and road clearance as a Cadillac passenger car. Its front section is made of molded plastic.





### Big Mixer Without Motor Operated With Hand Crank

Developed in England, a low-cost kitchen appliance resembles an electric mixer except that it has no motor. The housewife operates a hand crank which is geared to turn the beaters rapidly. Another handle controls the height of the beaters and their position in the rotating bowl.



### Tiny Radioactivity Scope Fits Into Shirt Pocket

You can detect radioactivity with a one-ounce plastic device the size of a pocket-knife. The user darkens the room and then holds the specimen against one end while he looks through the other. The tiny unit contains a lens and a phosphor-coated screen which registers flashes of the rays.

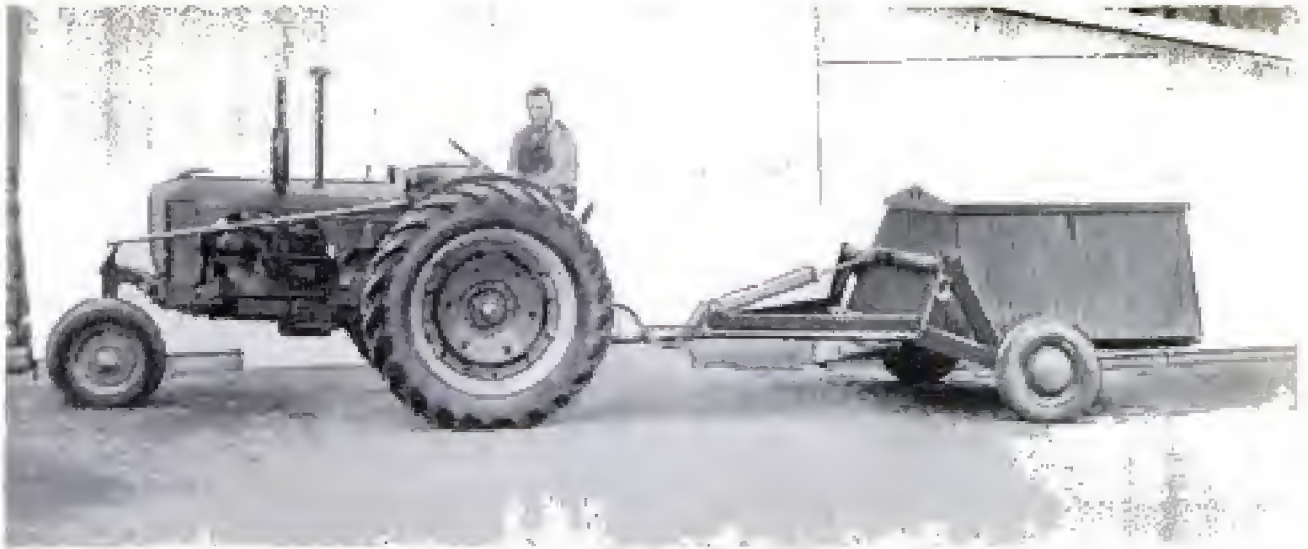


### Diners Eat "Hot" Meal On Heated Furniture

If a German engineer has his way, you'll be able to dine outdoors in comfort any time of the year. The designer has come up with a dining table for chilly weather. Electric heaters warm the diners from above, from the backs of the chairs and from the table itself. And their legs don't get cold either—they're warmed by heaters under the table.

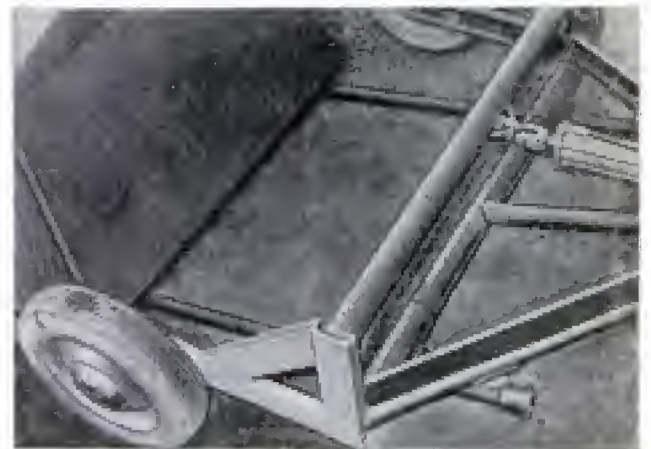
### Even Beds Go King-Size

Aware of the increasing average height of American men, the bedding industry has agreed on standard dimensions of a king-size bed. It will be 82½ inches from end to end. This will comfortably sleep any six-foot four-inch basketball player, and would even accommodate a six-foot ten-inch man. U.S. Army records show that the number of men over six feet tall has increased 70 percent since 1918.



## Hydraulic Hog-Moving Trailer Loads and Unloads Itself

Moving hogs to clean pasture is a simple chore on the Irvin Fritz farm in Franklin County, Ind. Fritz has built a tractor trailer that loads and unloads itself. He backs up to a hog house filled with a sow and her pigs, flicks a hydraulic control, and the trailer lowers to scoop up the coop. Another flick of the lever dumps the house at its new location. A hydraulic piston mounted on the trailer is connected to the tractor's hydraulic system.



## Sweden Builds Plastic Sports Car That Weighs Under 2000 Pounds

Weighing less than 2000 pounds fully loaded, Sweden's first plastic-body sports car will go 97 miles per hour with its economical 70-horsepower engine. It accelerates from 0 to 60 in just under 8 seconds. The chassis is of tubular construction, stiffened with a strong

sheet-metal "backbone." The metal parts are perforated to save weight. Lightness was the principal aim of the car's designers. Called the Volvo Sport, the car is being produced for export only. It has twin carburetors, a 7.8:1 compression ratio, high-lift cam and overhead valves. A 27-pound plastic hardtop roof can be fitted to the car in a few seconds. Production rate is said to be one a day and the principal market is expected to be in South America. It is not being billed as a competition car, but rather as a fun car for the sportsman driver.

## Harmless "Gun" Frightens Dogs

Now you can chase dogs from your lawn and shrubs with a harmless "gun" that does nothing but frighten the animals. A small metal box on a 10-inch spike contains a cap and firing mechanism activated by a thin nylon cord stretched near the ground. When a dog touches the cord he sets off a small explosion and scares himself out of the yard.



☛ Spraying nitrogen in solution on leaves of growing wheat has increased protein content of the grain 9 to 17 percent.

# ESCAPE AT SIX FATHOMS

—“Deep six,” the submariners call their salt-water school for emergency exits

By Fred Harden



Divers supervising the drill give signal to lower bell loaded with trainees. Inside bell, trainees wear Momsen Lungs while a supervising diver stands by to prepare them for the ascent



**N**OW HEAR THIS!" boomed the loudspeakers. "The crew off the *Sea Dog*—fall in on the starboard side of the ship for 'deep sixing'."

Sailors, clad only in swim trunks, ran to the rail of the little submarine-rescue ship, the *USS Penguin*. Each clutched a strange piece of equipment resembling a canvas water bag, a Momsen Lung. It was their first drill in underwater-escape technique, an exercise that is held nearly every week in the warm tropical waters off Key West, Fla. In minutes the first group of men would strap on their Lungs, be lowered six fathoms into the sea and cast loose to float to the surface.

The six-fathom (36-foot) release point gives "Operation Deep Six" its name, and the drill is a realistic rehearsal for men who may someday be forced to vacate a sunken submarine.

Most of Uncle Sam's undersea sailors pick up this training when they pass through the sub school in New London, Conn. But there are some who transfer to subs directly from surface ships, and others who must requalify every year. Most of these men get their escape training at Pearl Harbor, in a special tank similar to the 100-foot-deep tank at New London.

The rest train in the waters off Key West, home port for a large number of the Navy's Atlantic Fleet boats, where Gulf and Atlantic waters crisscross and trainees get the feel of real currents.

Operation Deep Six off the *Penguin* revolves around a "half bell," built especially for the open-sea exercises. It resembles an opened tin can turned upside down and has a platform beneath on which trainees stand as the bell sinks into the sea.

An air hose runs from the *Penguin's* mammoth air compressor to the bell and provides enough air to keep the water out. Water comes no higher than the chests of the men. Two air bottles mounted inside the bell are used to fill the Momsen Lungs before trainees ascend.

With the *Penguin* at anchor, the bell is hoisted over the side by a huge boom and the operation is ready to begin.

"First five over the side," says the senior diver of the *Penguin*.

Two qualified divers from the *Penguin* take their stations with the bell. One stands by inside to charge the artificial lungs and to man the ship-to-bell intercom. The other follows the bell down and then accompanies each trainee during his ascent. With the first five aboard, word passes from the

bell to the ship: "Take her to six." As the bell is lowered, air pressure increases.

At the desired depth, the trainees test their Lungs by ducking under the surface. If all Lungs are working well, the *Penguin* diver charges them with fresh air and the men are ready to make their ascents.

A line runs from the platform of the bell to the main deck of the *Penguin*, so that the men will have something to guide them upward on an even course.

Ascents from a hundred feet have been made successfully without the Momsen Lung, but this is not a recommended practice. A "free ascent" requires a cool head. Contrary to popular belief, you can never run out of breath when you start from the bottom up. Your lungs fill continuously as you rise and unless you exhale often your lungs will burst. This is where the Momsen Lung comes in handy. It exhales for you.

Even with a hundred men taking the training, it's not until the cry "Number One on the surface" that everyone breathes a little easier. From then on, it's a matter of arithmetic.

Aside from its importance as a training exercise, escape training is a great morale booster. It's good to know you can escape if you have to. ★ ★ ★



Ship's divers stand by as the bell is lowered into the sea. Five trainees descend at a time

Skilled divers follow trainees to the surface to guarantee a proper ascent



# WHAT'S NEW FOR Your Home



1

**1. MIDGET DRIER** will dry hosiery in five minutes, can be used to warm the bathroom on a skilly day or as a hair drier. The unit is portable or can be mounted on the wall of bathroom or nursery. It has a tumbling action which is easy on lingerie, and comes equipped with a 60-minute timer switch



2

**2. SHARPENING TOOL** will put a new edge on knives, scissors, lawn mowers, hoes, axes and all kinds of household and gardening tools with a few light strokes. The sharpener is easily adjusted with a setcrew for all types of blades. A small wheel on one end of tool makes an efficient glass cutter



3

**3. BUILT-IN BROILER** with finger-tip control can be raised or lowered without burning the hands in this electric range. Height of the broiler can be adjusted as much as two inches with a simple lever. The lever fits any one of seven slots and provides an easy means of heat control without removing food



**4. IN-THE-WALL BED** is so thin it can fold into any standard two-by-four wall space. A flush door or panel hung on concealed hinges hides this comfortable bed when it is not in use. The key assembly is also concealed and is easily unlocked by inserting a key through a small hole in the door



4

**5. SIT-DOWN SINK** has a shallow bowl designed so knees and legs can slide easily underneath. The peninsula-type sink has three bowls, a shallow one for preparation and deep ones for rinsing and dish-washing. A swivel-mounted faucet serves all three. Two-bowl design is available for counter arrangement in conventional plans. It's made of stainless steel

**6. BACK-SAVING MOP** can be angled to six different positions, enabling the housewife to clean under beds, dressers and other hard-to-reach areas without bending or stooping. The angled position makes it much easier to dust door and wall moldings without moving the furniture. Simple attachment can be put on any mop by merely sawing through handle

**7. BED-RAIL EXTENSIONS** provide that extra leg room and are available in four and six-inch sizes. Made of solid hardwood and equipped with two metal bed fasteners, the extensions require no tools to attach them to the bed rail and footboard. Regular-size mattress can be used with four-inch extension, but the larger size requires extra-length mattress

**8. GARBAGE CAN ON WHEELS** can be pushed or pulled with ease, parked at the back door or a far corner of the yard. The can is mounted on two rubber-tired wheels and the lid is attached to a spring-actuated handle that serves to lift the lid or hold it tight on the can. This garbage holder is not easily upset and can also be used for gathering leaves or trash



## Will Cattails Become Source of Food and Fiber in the Future?



Cattails — those big “weeds” that grow in swamps — may someday be an important source of food and fiber. Research at Syracuse University has shown an amazing number of uses for the plant. The roots or rhizomes could be eaten like potatoes or ground up to make flour. The flour can be fermented to produce ethyl alcohol. Research shows that soft fibers may be extracted by chemical treatment of the stems and leaves. These fibers can be used to stuff furniture and make string, burlap and webbing. Cattails have a prolific yield. On one acre 140 tons of rhizomes can be produced.

### Fast Cable Layer

Two men can bury a mile or more of cable a day with a rig designed for a Massachusetts power company. A deep plow attached to the drawbar of a Caterpillar tractor grooves a trench and the cable is simultaneously laid in the bottom. Two cable reels carrying about one mile of wire are mounted on a sled which is dragged behind the tractor. As it is pulled along, the sled covers and smooths the cut.



### Three Lubricants Packed in Kit

Three lubricants, each in a squeezable plastic dispenser, are contained in a compact plastic case. One of the lubricants is all-purpose oil for use on household appliances, hinges and fishing reels. Another is graphite powder, suitable for use on auto doors. The third lubricant is liquid graphite for automobile speedometer cables.



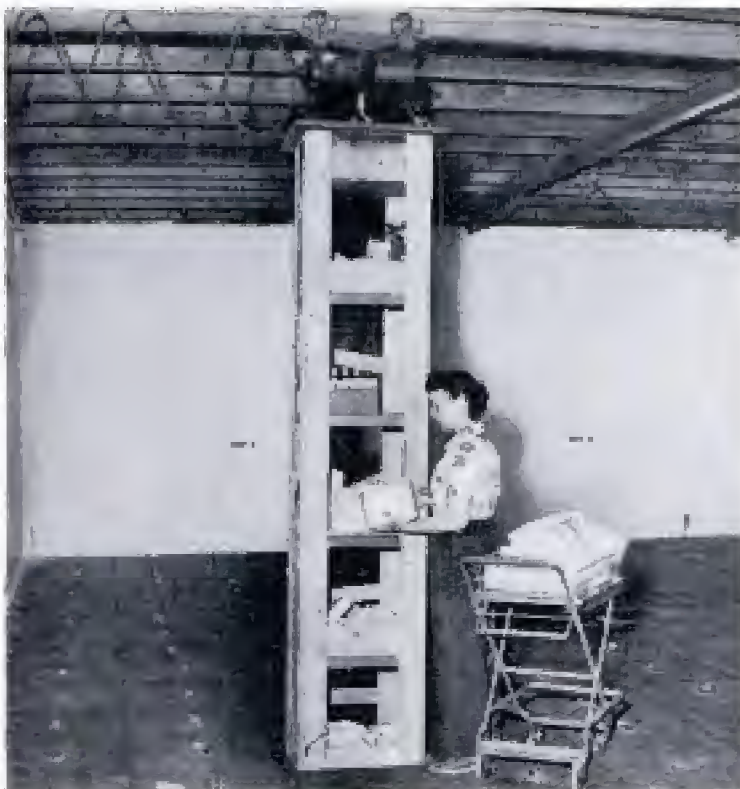
## Flashlight Beams Teach 12 Pupils the Intricacies of Dancing

Students quickly learn even the most intricate dance steps by following a pattern of lights projected on the floor by a mechanical dancing teacher. The machine stands on three legs of aluminum tubing and has long arms that stand out straight to support a series of lights. Rods connect to the feet of the human dancing teacher so they project the pattern of her foot movements on the floor. As many as 12 students can follow the beam at a time and, no matter how inept they may be, none ever steps on the teacher's toes.



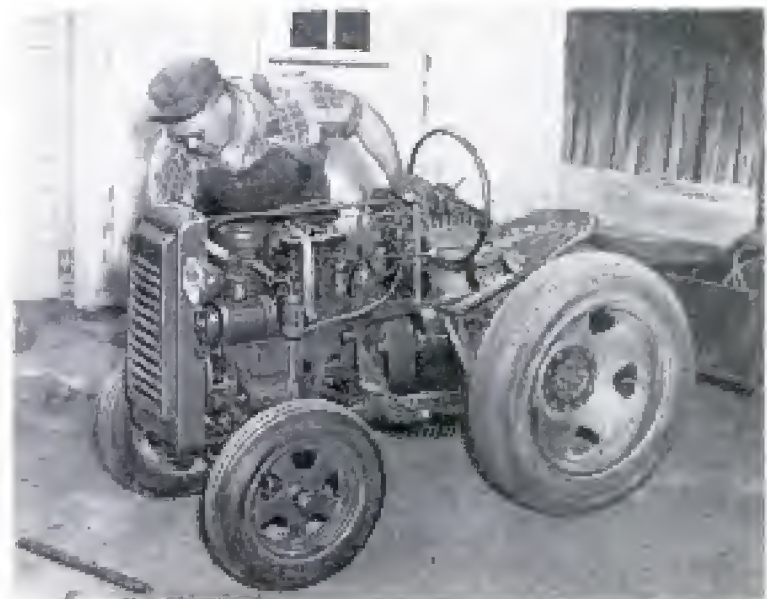
## Frozen-Food Locker Pulled Out of Floor

Rented lockers for frozen food are pulled up out of the floor in a Franklin, Calif., plant. The installation takes two thirds the space and one half the electricity needed by a conventional locker plant, where customers must enter the freezing room. Each locker consists of a tall, shelved wooden crate open on one side and a top cover that fits snug in the floor of the room above the freezing chamber. The customer removes his padlock from a steel ring on the lid and inserts the hook of a power lift that is mounted on tracks above the customer's head. The chain lift pulls the locker up until the desired number of shelves is exposed.



## One-Cylinder Engine Powers Tiny Tractor

If you're looking for a tractor that roars and has bulging "muscles," you won't be interested in a homemade model built by Donald Aspy of Jay County, Ind. He took a tiny one-cylinder engine from a Deleo light plant and hooked it up to a Dodge truck gearbox, a Studebaker rear end and various assorted parts reclaimed from wrecks and junked cars. Very small and maneuverable, the tiny tractor hauls wagons around Aspy's property and is so useful that his neighbors have talked him into making several others for them.





# That Wonderful Volcanic Popcorn

Photomicrograph of expanded perlite particle shows myriad tiny glass-sealed dead-air cells that compose it

By Charles Ballenger and Richard Dunlop

**V**OLCANIC LAVA from the wastelands of western America is being popped like popcorn to produce a material that can slash construction costs, cut heating bills and increase fire protection.

In some forms, the volcanic popcorn promises to increase the storage space in your refrigerator, help place cheaper meat and fruit on your table and perform hundreds of industrial tasks. It even provides Hollywood movie makers with realistic dandruff for actors.

This new pearl-gray material is called perlite in both its raw and processed forms. It is a glassy volcanic lava known to man for thousands of years, but it took a metallurgist working in a little Arizona town to discover its unusual properties.

Since the beginning of time, the lava flows in our western lands have existed in the badlands, in the mountains and the desert. The badlands are like a close-up view of the moon, forbidding and lonely. Men in their search for minerals passed them by.

Perlite itself is so razor-edged it will cut a hiker's boots to ribbons. It is too brittle and sharp for roadbeds. It is no wonder that the rattlesnake and the Gila monster had the perlite barrens to themselves.

Now, however, perlite is a bonanza

mineral. Expanding or popping perlite transforms it into a coarse, lightweight aggregate. Combined with plaster, perlite aggregate is causing a basic change in the plastering industry. With cement it forms an extremely lightweight concrete which promises to save huge quantities of steel.

Moreover, perlite is absolutely fireproof. It makes highly effective insulation and soundproofing.

Dr. Harry Huntzicker, director of research for United States Gypsum says: "If, in the laboratory, we were to take natural elements and combine them into a perfect aggregate, we probably would end up with perlite."

The processing of this perfect aggregate is almost an engineer's dream in simplicity. No deep burrowing in the earth is necessary as perlite can be scooped up from the surface. After being crushed and graded, perlite is heated in furnaces at a temperature between 1400 and 2200 degrees Fahrenheit. Rapid parching explodes the grains of perlite into kernels which look something like tiny dried peas. Then the material is ready for use.

Easy as all this sounds, the process went undiscovered until 15 years ago when Lee Boyer happened upon it quite by accident. Boyer, who was operating an assay office



Lightweight slabs or blocks of perlite concrete can be sawed, nailed, drilled or channeled with ease



Perlite concrete poured over metal lath becomes lightweight roof deck and insulation for hangar

in Superior, Ariz., had taken an ancient assay furnace and converted it into an open-end firebox. For months he experimented with the furnace in the hope of fusing a mixture of silicates into a new insulating material for the telephone company.

One day he brought in a sack of crumbled perlite from the great lava flows on the slopes of near-by Picket Post mountain. Acting on a hunch, he threw a shovelful of the brittle stuff on the flames and peered into the furnace to see what would happen. Suddenly the perlite began to pop. The exploding particles bombarded the interior of the furnace and whizzed out on the floor at his feet. He cut off the flames

and stood watching with amazement until the popping stopped. Then he picked up a handful of the expanded perlite and examined it curiously.

With a microscope Boyer could make out a cellular structure with sealed pores. He realized immediately that perlite would be remarkably resistant to the conduction of heat. Boyer then took raw and expanded perlite samples to the Arizona Department of Mineral Resources in Phoenix. There it was found that raw perlite contains from two to five percent of water sealed in the pores. When it is heated, the water changes into steam and the perlite explodes. It is thought that this water was trapped when the erupted lava and accompanying steam

Hill of perlite near Colorado Springs was formed by cooling lava. Rocky Mountain region is source of perlite





Life preservers made from solid perlite concrete float easily. Weight of perlite concrete is 25 to 35 pounds per cubic foot

were cooled rapidly beneath the waters of a lake or stream.

The department's tests not only confirmed Boyer's observation on insulating qualities of perlite, but revealed that perlite was absolutely fireproof, extremely lightweight and had many other valuable properties.

Back in Superior, Boyer set up a pilot plant for the production of perlite. While experimenting, he used the mineral as an aggregate with gypsum plaster in place of sand. To test it he plastered the office building and outdoor screen of a Phoenix drive-in theater. After 13 years of exposure to the blazing Arizona sun and chilling desert nights, the plaster is as sound and uncracked as the day it was applied.

War shortages cut off further development and only now are the potentialities of perlite becoming evident, particularly in the building industry. Processing plants are springing up all over. Perlite is usually crushed and screened at the mine. It is then shipped, unpopped, to an expansion plant near the market. Huge freight savings are made because one carload of perlite blows up to 10 or more carloads of the finished product. In the most modern expansion plants, the substance is handled pneumatically from start to finish.

The expansion of perlite was not a patentable principle and soon a host of independent producers were in the field. Today,

nearly all the big gypsum processors have staked out their claims in the perlite industry and the race to market the new material is on in a big way.

The ultraconservative building industry always has been slow to accept new methods and materials. But perlite has met every requirement of the contractors. Builders and architects are employing perlite plaster and concrete in the construction of skyscrapers, apartments, warehouses, farm buildings and especially private homes.

Perlite plaster can cut by at least 15 percent the amount of steel needed in a skyscraper, according to the architectural firm of Holabird & Root & Burgee. This amount of steel in a typical building is devoted to supporting masonry required to give the steel itself essential fireproofing, since steel has a relatively low melting point.

With light steel and light aggregate plaster, the architects found about 20 pounds per square ground foot could be saved in a typical 12-story building over the conventional steel frame fireproofed with concrete. This resulted in a 40-percent saving in cost.

The lightweight steel frame went up faster with less labor, and greater flexibility of design was possible. The steel used in this technique is more plentiful than the steel in larger rolled beams commonly used.

Interior walls made with the perlite plaster weighed 12 pounds per square foot instead of 40 pounds. Perlite plaster and concrete used with aluminum building materials make the new 30-story Alcoa Building in Pittsburgh the lightest office building of its size ever built. Total weight of the building's exterior walls was only 40 pounds per square foot as against about 150 pounds for conventional walls. A neighboring skyscraper with 6000 square feet less floor space used nearly twice as much structural steel.

The greater fireproofing and insulating qualities of perlite plaster and concrete contributed to another saving in the Alcoa Building. The exterior wall of a typical office building has a four-inch facing and eight-inch backup wall. With perlite, a four-inch backup wall provided the same insulation and adequate strength. This added the equivalent of a floor and a half of rentable space to the building. Space in a swanky office building doesn't exactly rent for peppercorn, and Alcoa is reported to be quite

happy about the added revenue.

One of America's biggest plastering contractors has found that because perlite plaster is only half as heavy as sand plaster, his men can, with less fatigue, put on 50 percent more perlite plaster by hand in a day.

Because of a new plastering machine developed for use with lightweight aggregates such as perlite, walls can be put up much faster. Sand plaster and concrete are too heavy for the machine but, when perlite is the aggregate, the machine is able to blow the material onto the walls at such a clip that a workman can do four times as much wall area in a day as the fellow who is troweling sand plaster by hand.

In a new 12-story Cleveland apartment project, builders were able to save 45 tons of steel by the use of perlite plaster on ceilings and for column fire protection. This amounted to a cash saving of more than \$8000 in the 100-dwelling-unit structure.

Perlite is processed and packaged under rigid quality controls at the plant. It is delivered to the building site in neat bags. For many jobs a premixed perlite and gypsum is available. All the plasterer has to do is add water. For special jobs, perlite and gypsum must be blended at the site.

The bags of perlite are so lightweight that they can be stored on the floor where the work is being done. Because the materials are out of the weather, they do not have to be thawed before use.

All of these advantages will help save you money when you set out to build or buy a home constructed with perlite.

Even the building methods are unusual. You go to see your new house. The walls are up and the building is ready for plastering. A truck pulls up, loaded with perlite and gypsum plaster packaged in neat, ready-to-use sacks. Also on the truck is an odd-looking contraption which turns out to be a plastering machine. Workmen run a long hose into the house, pour mixed plaster into the machine and add water. They spray on the plaster with such speed that you're in your house weeks sooner than you expected.

(Continued to page 234)



Plaster made with perlite instead of sand weighs only a third as much as ordinary plaster, is both decorative and fireproof



Perlite core fill for concrete blocks can double insulating effect of wall. Perlite insulation can't rot, decay or settle. Spraying machine below does the work of four plasterers. Light weight of plaster made with perlite makes spraying possible





## Outboard Moves Islands Around

Islands — the floating kind made up of aquatic plants and weeds—sometimes drift over bathing beaches or select fishing spots in the Minnesota lake resort area. When this happens resort owners get out the outboard motorboat and push or tow the island to a spot where it can't hurt fishing or swimming.

## Portable Mortar Mixer Pushes Like Wheelbarrow

Frank Ray, of Winfield, Kan., has built a mortar mixer that he pushes around like a wheelbarrow. It mounts a small electric motor that drives a cam and revolves the mortar pan. A paddle unit is mounted off-center on the cam so the paddles stir the mix as the container turns. Ray uses the mixer to supply fresh mortar for block and brick laying on his new poultry house. He simply shovels in the correct proportions of cement and sand and lets the machine do the rest.



## "Skis" for Wheeled Plane Permit Landing on Water

Standard airplanes can alight on land, water, ice, snow or mud with a new type of landing gear. The equipment looks like a pair of skis. Each "ski" is elevated slightly from the ground and has a hole in it for the wheel, so that conventional landings can be made on airport runways. On water, the plane comes down and skis on the water's surface until it taxis up and onto a beach, ramp or float. Safe take-offs and landings can be made on a strip only two or three plane lengths long. Water take-offs are made by starting on a short ramp and then skiing on the surface of the water until airborne. The manufacturer envisions its use on large transport planes. Then it would be possible for large planes to land in Chicago on a ramp in Lake Michigan or in Manhattan along the Hudson River.



# Why Not Design Your Own Machinery?

By the Rev. C. H. Lange

Pastor, Faith Lutheran Church, Detroit, Mich.

**EVEN A MINISTER** must take time for relaxation and I find my diversion among my tools in the workshop. I've built most of the furniture for our home and study.

But my greatest pleasure in my avocation has been in designing and building small machines for home use. Perhaps these machines will give others some ideas.

About three years ago we purchased a small piece of property on Lake Huron. Our main problem was how to keep the grass cut. Who wants to take seven hours of fishing time to cut an acre of grass with a 20-inch mower?

Also, about that time, my nine-year-old son suggested that he wanted a car. Well, with odds and ends plus a little gas engine I built a miniature car which he still drives around the countryside. It suddenly occurred to me that he could also work while he played, so the following winter I built a "convertible" which he can ride but which can be converted into a rotary mower.

But even with two 20-inch rotary mowers it still took us four hours to cut the grass. Too much time wasted when fishing was good!

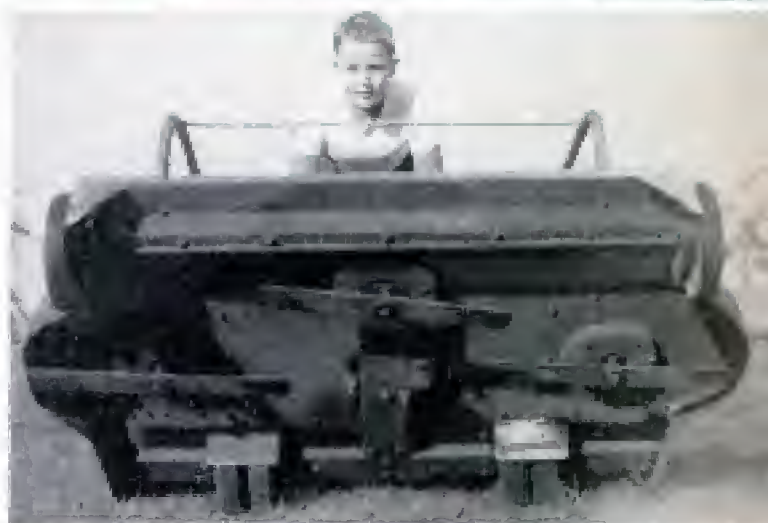
The result was our triple rotary. Powered with an eight-horsepower engine, it leaves our lawn looking like a golf course with less than two hours of work.

During the past year I've also built a motorized fish scaler and an electric tree sprayer. And I've come to the conclusion that nothing can beat pattering around in a workshop as a way to relax—usefully!

Motorized tree sprayer, shown below, and a power-driven fish scaler were also designed by the author



Big mower at left is driven by an eight-horsepower engine. Boy rides car his father designed and built



Bottom of the big mower shows the three blades that chop down grass and small brush in a broad swath

Two 20-inch mowers go to work on the lawn. The one at the left is converted from the miniature auto



# Mountain Goats On Two Wheels

By Arthur R. Railton

**L**IKE A MAN seeing his first giraffe, you'll say "Impossible!" when you see your first motorcycle hill climb.

It does look impossible. At Mount Garfield, near Muskegon, Mich., where the national hill climb is an annual event, the hill stabs upward at a 45-degree angle, its summit higher than a 30-story building. It is so steep that walking down is difficult—walking up is for the athletic only.

The surface is unpaved. Just enough grass pushes through the loose soil to give an illusion of firmness. Once the cycles begin chewing it up, the surface becomes as unstable as spaghetti.

Yet the contestants (at least some of them) roar to the top in well under 10 seconds. And with no running start. There is a 25-foot level stretch before the hill tilts abruptly upward, but that's only long enough for a rider to get his balance.

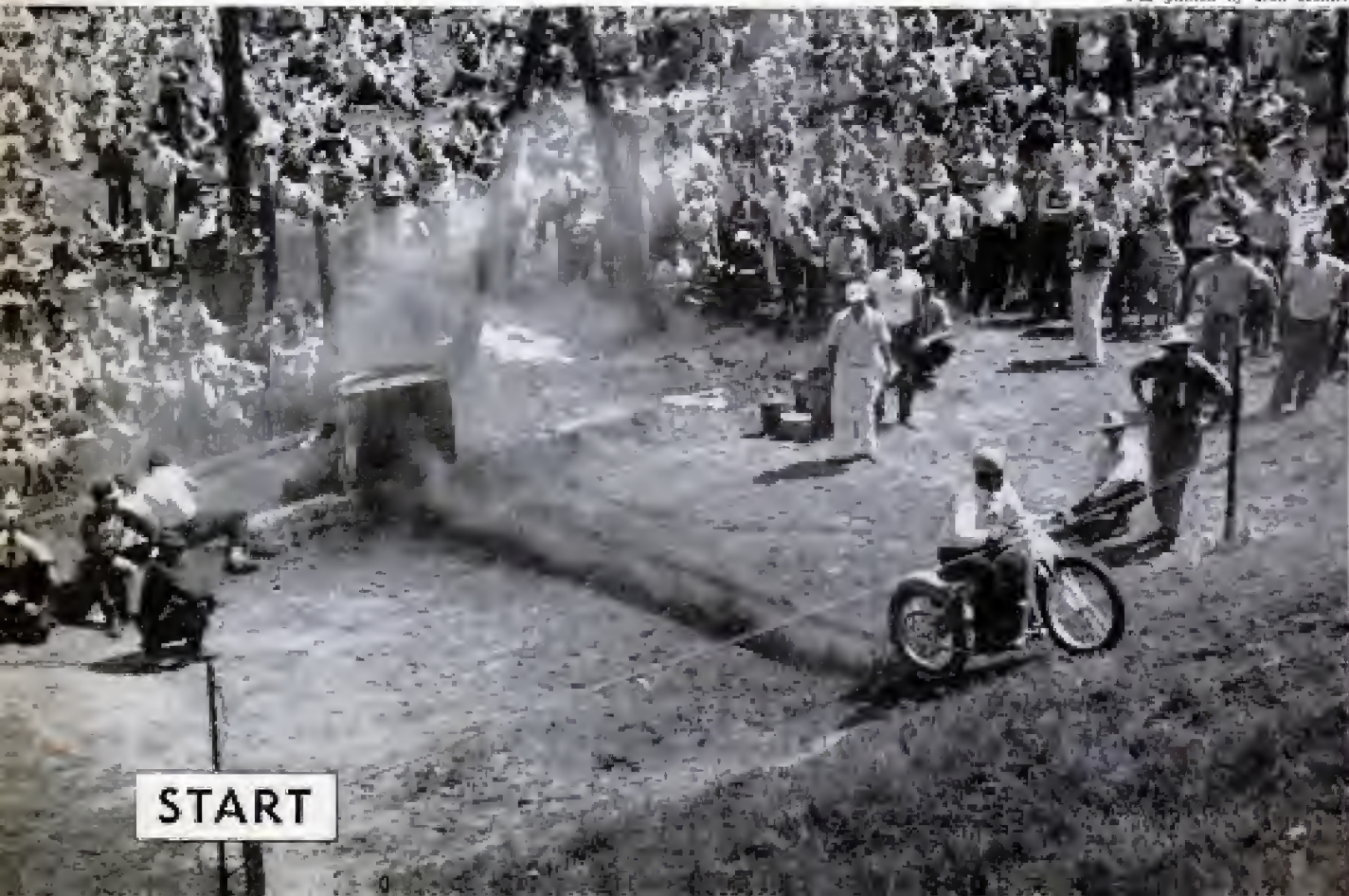
Runs are timed to the hundredth second. The fastest time wins—

PM photos by Don Hankes



Spewing sand and smoke behind him, a rider heads for the top of Mount Garfield, Michigan's 45-degree hill-climbing site

Riders get a 25-foot level run before breaking the string. The backstop shields spectators from dirt thrown up by rear wheel



START





With the finish line just ahead of him, this rider goes airborne as his cycle hits a bump

each rider competes against the clock only.

Hill climbs are noisy. Riders can't afford such useless weight as mufflers. They call their cycles "home brew" designs. Unlimited modification is permitted, the only restriction being displacement. Successful riders rebuild their machines until no factory can claim them. Frames are home-made, being longer and lighter than stand-

ard. Valves, cams and heads are special.

Fuels are secret mixtures of everything explosive. Alcohol is the basic ingredient. It burns cooler. (Because cooling fins are chopped off cylinders to reduce weight,

Over the top comes a rider as far below the crowd cheers him on. Record time for this hill is 7.54 seconds





Contestants have to walk back down the hill, but their machines are carried down by a ski lift in reverse. Note the heavy chains on the rear wheel



Safety rules require an automatic device to stop the engine if the rider is thrown off. When the thing is pulled from the handle-bar clip, ignition is grounded



Above, gymnastics don't win climbs! Rider is about to go over. Below, breaking timing string at start

engines run hot.) To the alcohol, riders add benzol, nitromethane and other ingredients.

To start his ride, the cyclist revs up the crackling engine at the base of the hill. When it sounds right, he signals his helper (often another contestant) to drop in the gear, called the "dog." The rear wheel spins and up the hill he goes.

There's no gear shifting. The machine has only one gear. There is no time for shifts when trying to climb 30 stories in eight seconds.

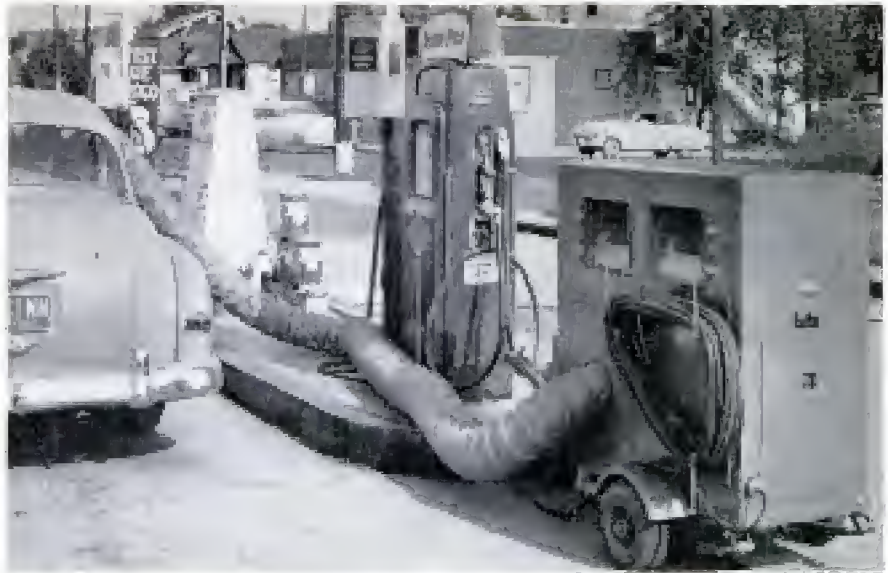
The rear wheel, studded with heavy chains, digs its way up the slope, spitting dirt behind it like a dog burying a bone in sand. With skill and luck, the rider makes it to the top. If he's thrown off his bike, an automatic cutoff stops the engine. Alert officials, stationed along the slope, grab the cycle before it can tumble back down and destroy itself. ★ ★ ★

Skill is required to keep both wheels on the ground. Winning rides are usually straight, fast, uneventful



## Air Conditioner Cools Motorists

Several gasoline stations in the Southwest have added a new item to their list of free services—"spot" air conditioning. A large hose attached to a three-ton portable air conditioner is poked into the car. Hot air in the automobile is replaced with a refreshing cool, dry blast. Airplane factories are also using the unit to cool workers on hot jobs.



## Quartz Infrared Lamp Resists Water Splashing

Quartz instead of glass is used in a tubular infrared lamp that won't shatter even when cold water is poured on its red-hot surface. The lamp is slightly larger in diameter than a cigarette and produces 100 watts of energy per inch of tube length—four times the energy concentration of a standard 250-watt bulb. A 5-inch bulb of 500 watts and a 10-inch bulb of 1000 watts are made. The heating element is the standard coiled tungsten filament. No warm-up period is required for the lamp, which has a rated life of 5000 hours. It is designed for heating, cooking, drying and baking applications. Visible light as well as infrared radiation is produced, an advantage in some applications.

## Steel Building Uses New Arch

An arch-type steel building combining simplicity and great strength has been introduced for farm and industrial use by a Milwaukee firm. The building achieves strength through use of a new corrugated-steel arch panel with a deep vee at one edge. The vee of one panel locks and bolts into the vee of the next, so that the panels become both the structural members and the sheathing. Windows fit into the arches.





### Sugar-Cane Cleaner

Installed on a plantation in Hawaii, a huge machine cleans sugar cane to prepare it for the mill. The machine does work which formerly required 210 men. When cane arrives at the plant it is loaded by crane on a belt system that moves on a track 84 feet long. Cane moves up the belt to the top where loose gravel, dirt and sand fall through openings while the cane is washed. The cane and light trash then ascend another conveyor and are washed twice more.

### Reading Machine for Blind Transmits Message by Touch

Blind persons can read an ordinary newspaper with a machine invented by an Italian electrical engineer. A photoelectric cell mounted on a framework is placed over the reading material. Electrical impulses are transmitted letter by letter to corresponding rods on the keyboard of the reception box. The blind operator "reads" the rods with his finger tips. The instrument, if successful, could revolutionize the reading habits of blind people. At present, they must depend upon scarce, expensive Braille translations.



### Back-Pack Vacuum Cleaner

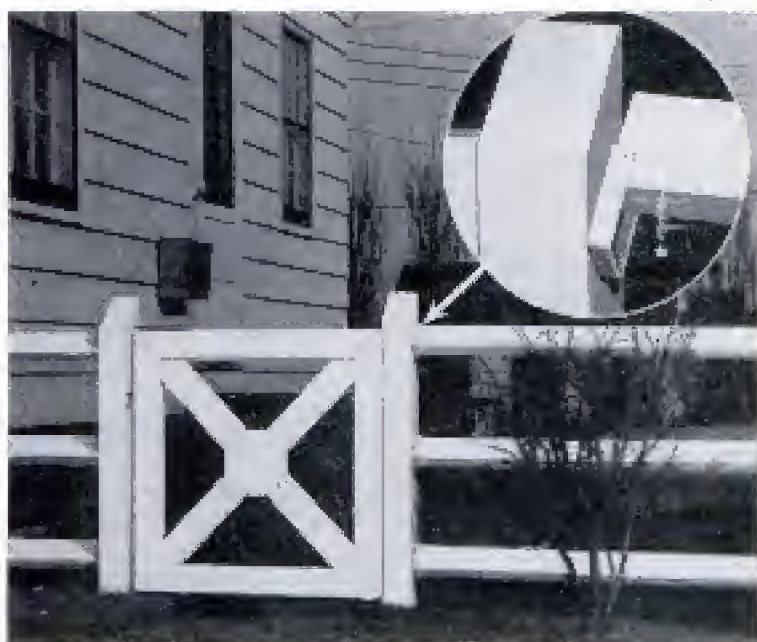
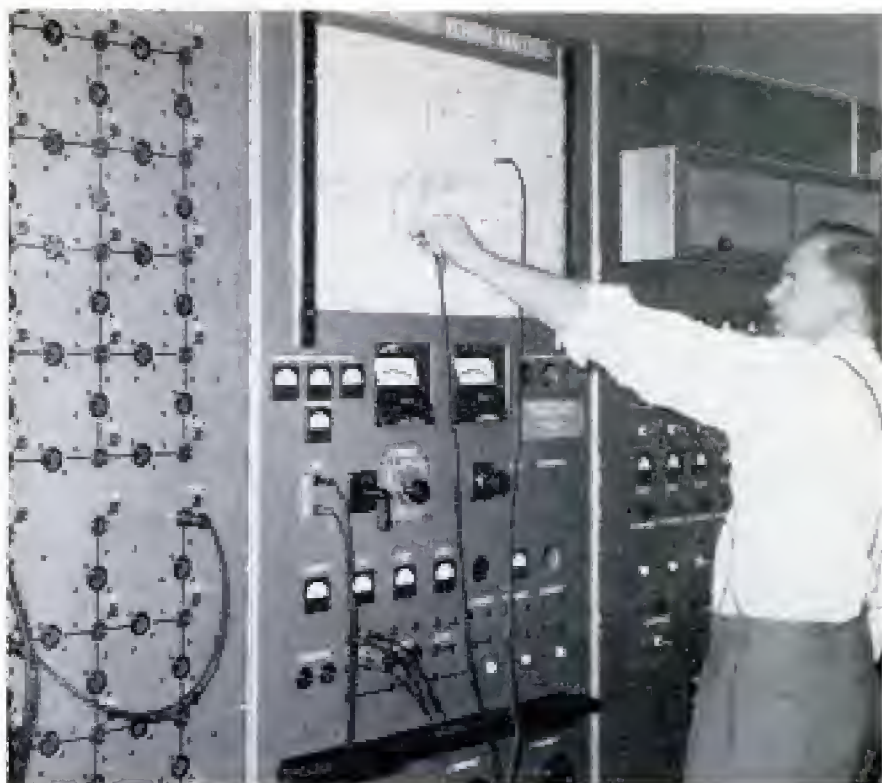
Janitors can reach areas that were previously inaccessible with a vacuum cleaner that straps to the operator's back. The cleaner is designed for use in schools, hospitals, churches and other large buildings. A  $\frac{3}{4}$ -horsepower motor and a dust bag are housed in the back-pack unit which weighs 10 pounds. The unit also can be pulled around on casters. Attachments are available for cleaning upholstery, books, Venetian blinds and furnaces.

### Synthetic Rubber Resists Heat

Poly-FBA, a synthetic rubber developed for use in jet airplanes, can withstand oils, gasoline and temperatures up to 400 degrees Fahrenheit. The fluorine-containing material resists the effects of synthetic oils which damage all rubber compounds.

## Electronic Pipe Line Saves Figuring

Planning pipe-line networks is speeded and simplified with an electronic circuit that represents the pipe line itself. Interchangeable vacuum-tube resistors are used in place of pipes. Different lengths, diameters and roughness of pipe, source and pressure of water and rates of discharges are all duplicated. The first analyzer to be produced came with 600 "pipes" in the form of vacuum tubes. In 58 hours, it provided figures that would have taken one man with a slide rule as long as two years to produce.



## On-Again Off-Again Fence

Fence rails slip in place quickly and just as quickly are removed for lawn mowing or access when installed with aluminum brackets. The brackets are nailed to the posts and the rails slip into them as into a mortise. To mow the grass under the fence you simply lift out the bottom rail. Brackets are available in different sizes.

## "Corkscrews" in the Sky →

Speakers at a recent Royal Air Force fire-fighting show were amazed to see "corkscrews" of foam shooting into the sky from high-pressure nozzles. The show included a contest between firemen of the RAF, the U.S. Air Force and other groups

Sources of available products described in this issue are indexed on pages 12, 14 and 16. Sources of further information on other articles are listed in the WHERE-TO-FIND-IT LIST, which is available to readers without charge from Bureau of Information, Popular Mechanics, 200 E. Ontario St., Chicago 11





### Single-Step Escalator Designed for Home Use

Next best thing to an Escalator is a moving stairstep that rolls up and back on metal guide rails. Designed for the home use of invalids, it is cable driven by an electric motor and has duplicate control buttons at top and bottom. The operating mechanism is installed beneath the stairs. When not in use, the rolling platform forms a double-width bottom step.



### Liquid Insulating Plastic Shockproofs Tool Handles

One dip of a tool handle into a liquid insulating plastic gives it a thick and durable coat. This renders the tool shockproof for standard home electrical work. Tools can be redipped until the desired thickness is reached. The handle is heated, dipped into the liquid, slowly removed and then heated once more to harden the coating. This gives a handle that is good looking, rustproof, won't slip and is comfortable to hold. The plastic can also heatproof cooking-utensil handles.



### Electric Train Shifts to Monorail

Model trains have caught up with—and even surpassed—the latest proposals of railroad designers. Fritz Krueger, a Berlin engineer, has designed an electric train that will run on two rails or a monorail. The one-rail system is similar to proposals for full-size monorails. Krueger's train runs along the normal two-rail layout, and at the end of the track it rolls onto a single large rail without losing speed. The designer hopes a full-size train will be built.



Shown here slightly separated are the car's four sections which permit it to be moved from studio to studio

## ***Come-Apart Automobile Stars on Television***



If the television script calls for an intimate look into the back seat only this much of the car is used. The hole in the roof is for microphones and lighting

WHEN THE National Broadcasting Company wants an automobile for a scene in one of its television dramas, it assembles it right on the scene. Because of the necessity for moving the car from one studio to another, the NBC property department had to cut the body into several pieces so it would go through the small doors of the studios. The car, a 1954 Ford, has no chassis, being simply a body with nonfunctional wheels that can be placed in position for effect. The various body sections are mounted on casters and held together by hasps. Holes are cut in the roof to admit lights and microphones. Windshield and rear window are removable when necessary to eliminate glare. The job of slicing the body into sections had to be done carefully to avoid noticeable joints that would destroy the realism when the car is used on television. The various sections, like the back seat, can be used separately.

Neatly assembled, the car appears to be real. The casters are easily hidden in the shadows under the car





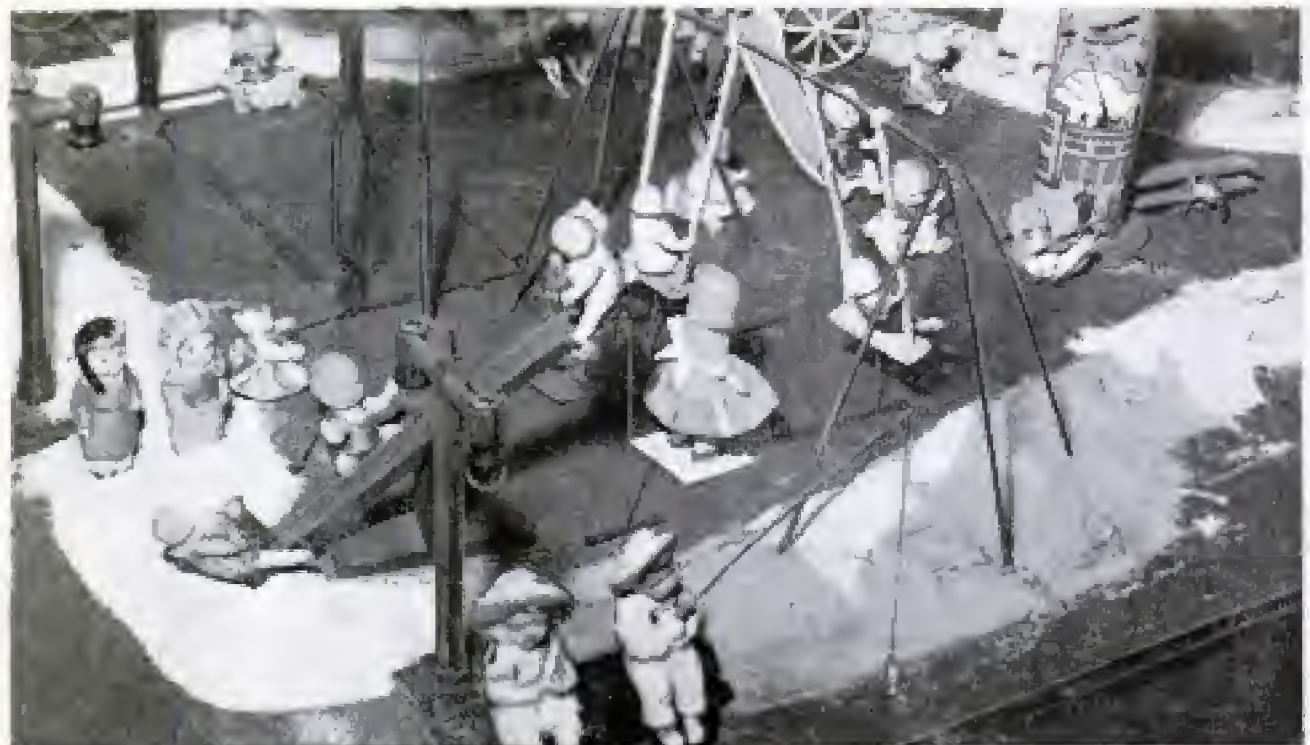
Myers' layout includes revolving tree, amusement park and church. Boy in church doorway pulls rope to ring bell



# CHRISTMAS-TREE

## Merry-Go-Round

Seesaws move and dolls push swings in playground. Street lamps look down on two boys fishing in stream







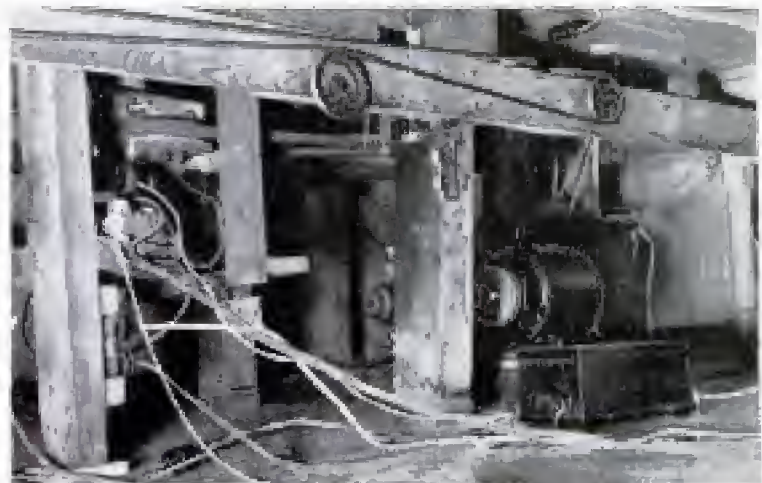
Merry-go-round is the base of the revolving Christmas tree. Carousel horses came from a five-and-ten store

**N**EW ORLEANS youngsters flock to the home of J. T. Myers during the Christmas season to view his mechanized Yuletide display. While a big Christmas tree loaded with 156 lights and over 1000 ornaments revolves, dolls in a playground push other dolls in swings. From a bridge, boys fish in a stream and beneath them sleek ships and swift cruisers speed through real water. There's also a swimming pool with a slide, board and swimmers.

Mr. Myers started the display 38 years ago when he used assorted gears and the motor of an electric fan to revolve his Christmas tree. Each Christmas since then, new features have been added. For 1953, it was a roller coaster that circles "Christmas Tree Island" every 60 seconds. Like all of the other turning, twisting, swinging, jumping and racing acts, it is powered by a central  $\frac{1}{4}$ -horsepower motor that furnishes drive at the same time for the religious section. Across the bridge is a church. At its entrance, a doll pulls a bell rope and steel bars beneath the stage clang like a church bell. Carols issue from a hidden phonograph. Above the two islands an angel announces Christ's birth to the shepherds and the Wise Men travel an endless belt to the manger. A smaller-size motor operates this section. ★ ★ ★



Roller coaster was 1953 addition. A chain pulls it to the top of tallest slide before its one-minute journey around island. A single  $\frac{1}{4}$ -horsepower motor beneath the platform powers every part of the display except the Wise Men on the wall above.



## Propeller Replaces Chain to Convert Saw Into Outboard Motor



With a new propeller attachment you can convert one make of chain saw into an outboard motor. The attachment replaces the saw chain. Only two bolts on the the saw must be removed and replaced to make the quick conversion from saw to motor. Clamped to the boat, the resulting outboard motor has ample power, permits 360-degree steering and can be adjusted to any water depth.

## Branding With Harpoons

In projects aimed at determining the migratory habits of two large animals, the Canadian government is resorting to novel methods of "branding." Identification tags will be harpooned into the tough hides of walrus in an effort to study their population and movement, and buffalo are being marked with paint sprayed from a helicopter. Instead of going through the dangerous business of roping and branding the buffalo, a government mammalogist flown over the animals leans out and squirts paint at them.

## Tubular-Steel Framework Supports Storage Bin

Tubular-steel sectional frames that can be assembled quickly to make temporary silos or storage bins are being produced for farm use by a Milwaukee manufacturer. The framework is lined with paper when used as a silo or grain-storage bin, and with snow fence for corn storage. A metal cap roofs the structure.

## Salt Firms Gravel Roads

Brine is being used to compact gravel roads. The brine, which has lower surface tension than water, mixes with particles of sand and gravel and allows them to push closer together. Thus the road compacts into a harder mass. Both roadbeds and surfaces stay in condition for a longer time with less maintenance. The treatment also tends to keep moisture from freezing and thereby reduces heaving. One county in Ohio uses 15,000 to 20,000 gallons of brine per mile of road.





### Alarm Spots Thieves, Fire And Even Kills Mice!

Thieves or fire, it makes no difference to an ultrasonic burglar alarm which detects either one and, as a bonus, kills any mice that might stray onto the premises. The alarm sends out sound waves at 19,200 cycles per second, too high-pitched for humans to hear. The waves rebound from the walls of the room in a barrage of detection. Any motionless object does not alert the device, but if an intruder so much as lifts an arm, the alarm is sounded. Or it can be set so that patrol dogs can roam through the area without tripping the alarm, but should a man enter, the alarm sounds. It can also be set so that any movement of warm air above a flame sets it off. Finally, these ultrasonic waves get rid of rodents by forcing them to kill



themselves by crashing into obstacles in a wild attempt to escape the maddening noise which is within the scope of their hearing range.



### Iron With Pivoting Point Reaches Around Corners

Time and tempers are saved by an electric iron with a pivoting front point that reaches around corners. The iron presses hard-to-reach spots that would require several extra movements with a conventional iron. Movement of the point is controlled by a twist of the handle. The product was shown at the German Inventors' Exhibition in Wiesbaden, Germany.

University of Wisconsin scientists are developing a method for aging cheddar cheese with ultrasonic waves which requires only one half to one third the present aging time.



Cecil Gough holds one of the ventriloquist dummies he makes as a hobby. On the bench are examples of the stages of making a dummy head—the plaster molds, the plastic-cloth head and a completed head on stick

By **Marshall L. Lincoln**

**A** MAN WHO EARNS MONEY with his spare-time hobby is no dummy. That's why Cecil Gough of Hartford City, Ind., was smart to start making ventriloquist dummies as a hobby after he retired from the drug business.

While giving him a relaxing activity, his "dummy business" also has given him some useful extra income, since his dummies sell for \$50 to \$150, depending on their complexity. Since starting his interesting hobby in 1949, he has sold between 35 and 40 dummies.

Gough puts a lot of natural inventiveness and mechanical ability into his hobby—and he finds a well-equipped woodworking shop comes in handy, too.

A granddaughter's interest in puppets caused Gough to start making a ventriloquist dummy for her five years ago. He admits his first attempt was rather crude, but it made him decide to learn how to build a really good dummy.

Since then he has made quite a batch of really good dummies — dummies which have been sold to ventriloquists all over the United States and some to people in

foreign lands. Recently, he shipped a dummy to a soldier in Nuremberg, Germany. He said this sale shows the far-reaching effect of a tiny classified ad he has been using for several years.

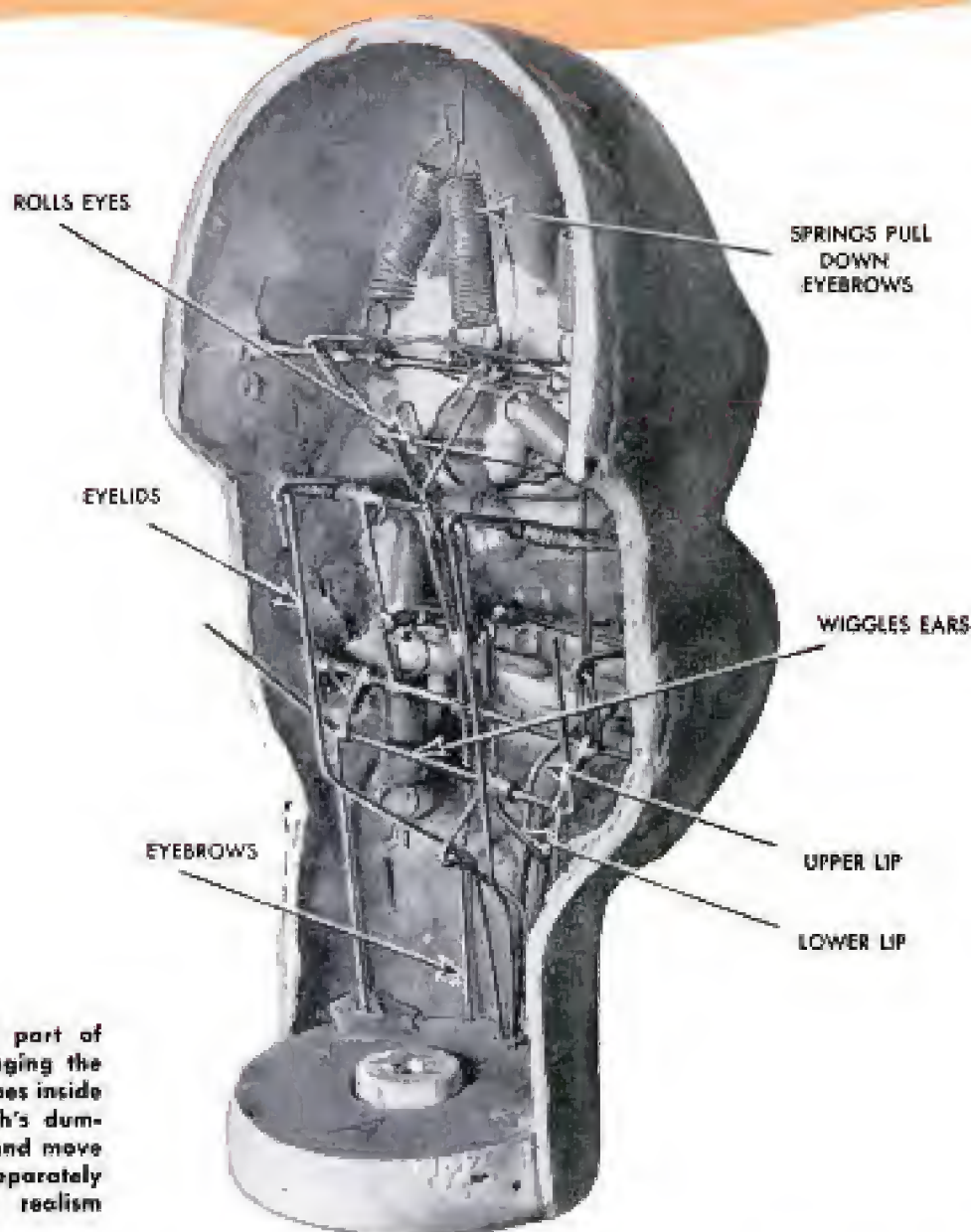
Gough learned his basic technique from books and the rest came through experience and a constant effort to make his figures more lifelike.

The torsos and heads of Gough's dummies are of Celastic, a plastic cloth which can be molded into any shape after it is softened with acetone. After it has hardened, the material retains its shape even if soaked in water. Such material is used by some shoe manufacturers in sole construction and also used by orthopedic craftsmen. Gough says it is ideal for his purpose because it is lightweight and easy to work.

To construct the head for a dummy, Gough first makes a head mold of modeling clay. Plaster of paris is then poured around this clay model to get two molds: A mold of the back half of the head and a mold of the front half.

From the two hollowed-out molds, he makes a one-piece plaster mold which

# Inside a Dummy's Head



By far the most difficult part of making a dummy is arranging the intricate mechanism that goes inside the head. Some of Gough's dummies can wink either eye and move the upper or lower lip separately—all in the interest of realism

resembles the clay head. This plaster head is called a "male head."

The plastic cloth is then softened with acetone and fitted around this mold. After the cloth has dried, he cuts it down the sides and removes the cloth in two pieces—the front and back. These pieces retain the shape of the plaster male head.

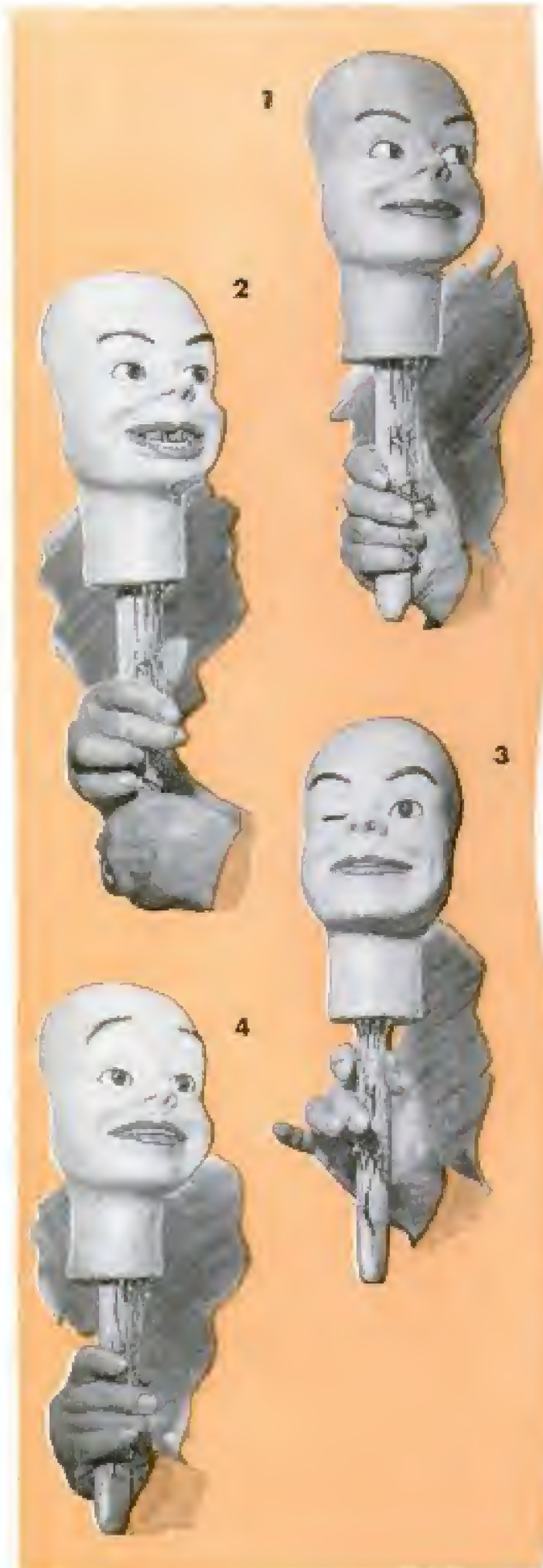
At this stage of the game, Gough begins to install the complicated mechanism which goes inside the head of each of his dummies. This mechanism is put in the front half of the cloth head.

His figures have much more than mere moving jaws. He installs levers, springs, weights and triggers in such profusion that,

when completed, a Gough dummy will wink either or both eyes, roll its eyes from side to side or up and down and move its lips. Some of his dummies can move either lip independent of the other. He now has a model that will stick out its tongue.

After all the necessary mechanism is installed, the two halves of the head are fastened together and flesh-color paint is applied.

The head, which is not connected to the body, is mounted on a long stick the ventriloquist holds in his hand during a performance. A hole in the back of the torso enables the performer to reach inside the dummy's body to grasp this stick.



Mounted on the stick are several triggers which operate the lip and some of the eye movements. Other eye movements are controlled by weights—for instance, when the head is tilted to one side, the eyes roll to the other.

Gough buys costume wigs and rebuilds them to fit the dummy heads or makes wigs from Saran or mohair.

The hands are made of the plastic cloth and painted flesh color. Gough's wife makes the costumes for his dummies—everything else is made by Gough in his garage workshop, which contains everything from power saws, drill press and lathe to tiny screwdrivers and tweezers.

After he had been making the dummies for a while, Gough decided he should know more about the problems faced by a performer in front of an audience so that he could build dummies which would be easy to operate.

To solve this problem, he took a correspondence course in ventriloquism and began performing before clubs and other groups in Hartford City and near-by towns.

Not only does this performing help him learn how to make the dummies easier to handle, but it gives him an extra thrill from his hobby.

Several times ventriloquists have called on Gough to have him rebuild dummies they bought from other dummy makers. Gough smiles with pride when he tells of such jobs because he likes to feel that his dummies are better than many others on the market.

By working steadily, he could make

1—Lifelike eye movements are one of the important factors in making a good dummy. An audience watches a dummy's eyes just as you do another person's. Tilting this dummy head causes the eyes to roll in a natural fashion due to well-placed weights inside the head

2—Here Gough demonstrates what he considers one of the neatest tricks performed by his best dummies. The lower lip is moving without the upper one showing the slightest tremble. All moving parts of the dummy's head are controlled from the stick by a skilled operator

3—In the hands of an experienced ventriloquist, this dummy head can produce a quick and natural wink with either eye. Gough constantly studies expressive movements of the human face with which to endow his dummies. He can now make a complete dummy in one week

4—The pose indicated here is of a "supercilious sneer." This effect is produced by lifting the dummy's upper lip without moving the lower one. Gough reports that this expression is particularly popular with ventriloquists who like to use dummy to ridicule themselves



Gough holds two types of heads he makes. Left, American type with loose jaw that bobs up and down. Right, English type moves the lips only

a complete dummy in one week, Gough says, but he prefers to work on the figures for a few hours, then turn to something else to keep his mind from becoming stale.

Often children write to Gough asking him to make a dummy for them, but he tries his best to refuse them without making them feel badly, since he realizes few people other than experienced ventriloquists know the amount of work which goes into a good dummy.

Gough doesn't mind doing the work for someone who will sincerely appreciate his efforts, though, for his garage dummy factory has provided him with an ideal after-retirement occupation which furnishes him with a source of extra income. ★ ★ ★

5—Newest dummy on which Gough is working has a special trigger that makes its hair stand up when the ventriloquist wants it to. The head shown here is unfinished. Dummies that can perform some unusual or surprising antic are in great demand by the professional ventriloquists

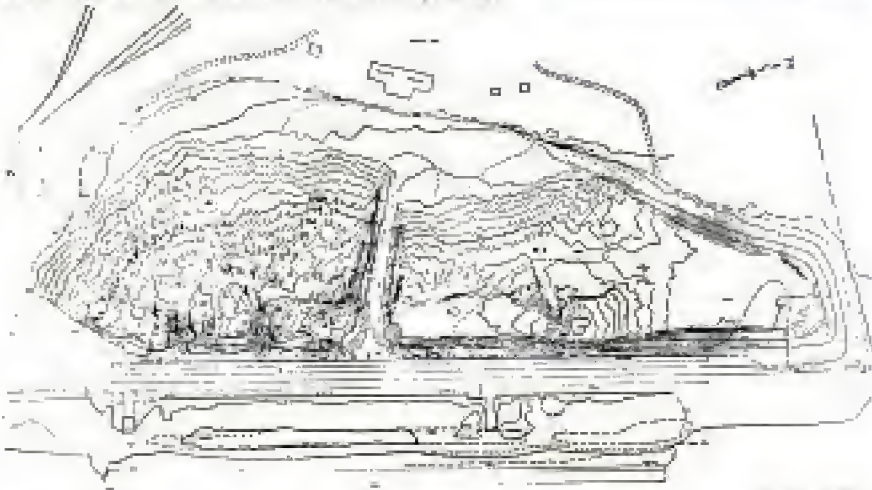
6—As every TV watcher knows, ventriloquist's dummies have a variety of personalities. Gough is making this one for an operator who wants a sassy character. The dummy can stick out its tongue when provoked or haughtily raise its eyebrows in addition to other conventional tricks





## Plastic Camp Trailer Has Bed in Drawer

Dentproof and rustproof, a streamlined plastic camping trailer expands at night to sleep three persons in comfort. There are two fixed bunks inside the trailer and a third bunk is fitted in a drawer which slides out from the rear. In the front end is a complete kitchen, including a two-burner stove, refrigerator, water tank, cupboards and sink. It sells for about \$1500.



## Stereo Pictures Measure Reserves

Stereo pictures taken from the air are now used to measure piles of coal, ore, pulpwood and sawdust. An airplane carrying a mapping camera flies over the area and takes two pictures within seconds to make a stereo pair of photos. These are viewed with a simple stereoscope for a general estimate or used in a precise stereo-plotting machine for an accurate figure. With the machine, an exact drawing is made with contour lines. Thus the pictures are reduced to a series of areas of known thickness on the drawing. From this, it is easy to estimate the volume of a pile.

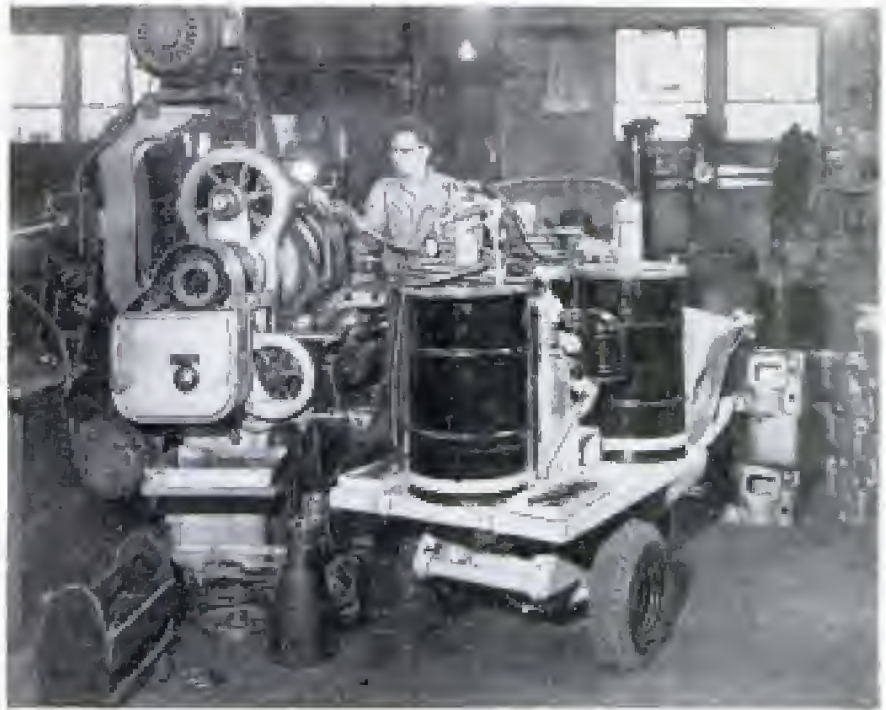
Contour drawing, top, was made with machine from stereo shots

One of a pair of stereo photos, left, used to make the drawing



## Mobile Service Station Takes Grease Job to the Machinery

Carrying its services wherever needed, a mobile service station is powered by a small engine that propels it over rough ground or up steep ramps. Designed for the lubrication of heavy machinery, the mobile unit has a six-horsepower Wisconsin engine. It does grease jobs, oil changes and other maintenance operations. It has an air compressor and a delivery hose for inflating tires. Standard 100-pound drums of oil and lubricants fit in carriers on the bed of the vehicle.



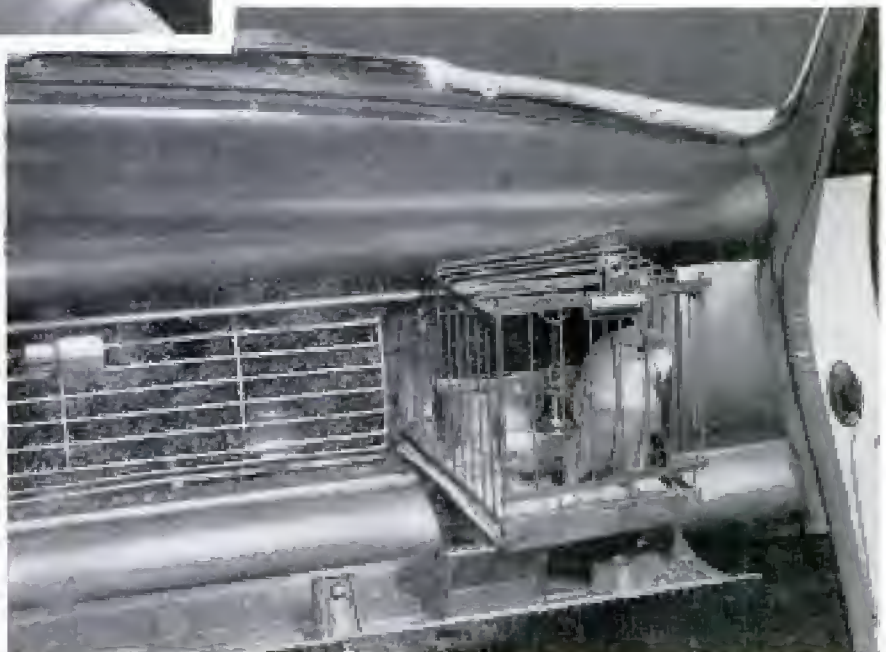
## Tractor Umbrella With Electric Fan Keeps Dust and Heat from Operator

Tractor operators are protected from heat and dust by an aluminum umbrella that contains a fan. The 12-inch electric fan at the top of the hood pushes a curtain of air down around the operator. It not only cools him, but keeps out dust, insects, fumes and spray or dusting chemicals. A deflector above the operator prevents the air from blowing directly on him. The adjustable unit can be mounted on practically any self-propelled farm or construction equipment. The fan is powered by the machine's battery. The adjustable umbrella is mounted on a telescoping steel tube.



## Glove Compartment Is for the Birds

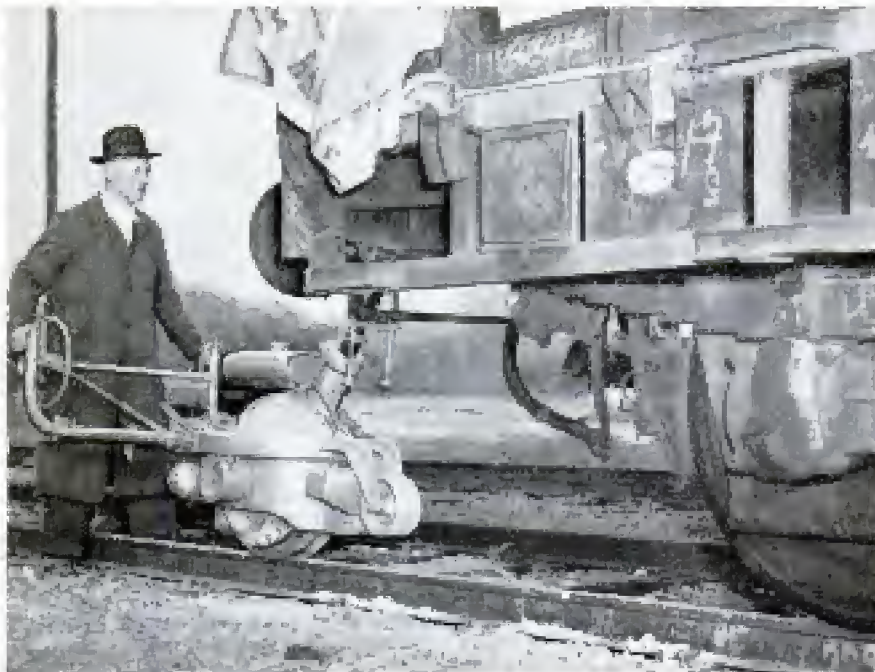
Probably the world's only winged motorist is an Australian peachface lovebird named "Tweety," who lives in Santa Monica, Calif. Tweety's owner discovered that his pet refused to eat and became ill when left alone or with strangers. So he built a cage into the glove compartment of his car. Now, wherever he goes, Tweety goes with him. There's even a porch for the bird.





### Pedals Operate Canoe Rudder

Anglers can "float fish" without paddling in a canoe equipped with a steering system. The fisherman paddles to the fishing spot, then fishes with the breeze to his back as he steers with his feet. A bracket is attached to the canoe, and the aluminum rudder mounted in the bracket. Cables run from the rudder to the pedals. The rudder swings free and has no effect unless the pedals are pushed. It deflects to one side or rides up over rocks and snags without damage.



### Motor-on-a-Wheel Shunts Rail Cars

Freight cars are shunted by a new one-wheel pusher, eliminating the need for locomotives in many yard operations. The motor-on-a-wheel was developed in Germany. It can move cars weighing up to 100 tons.

Lockheed Aircraft Corporation has converted its factory fleet of 120 gasoline-powered towing tractors and fork-lift trucks to propane fuel. Cost of the change-over: \$22,000. Annual saving in expense: \$40,000.

# RADIO *Television* ELECTRONICS

## TELEVISION TODAY

RECENT improvements in some TV sets include convenient top-panel tuning. The young lady tuning the Setchell-Carlson model, in photo A, no longer needs to bend or kneel; tuning is accomplished while standing comfortably an arm's length away—far enough away for accurate adjustment. Another feature of this television receiver is the Unit-ized chassis which consists of individual plug-in units.

Although it is not common practice to dunk television receivers, photo B shows a 21-inch Du Mont table model being dropped into the Passaic River at East Paterson, N. J., for a ruggedness test. It is claimed that it did not suffer from the fall or the dunking, and operated perfectly after being hauled out and dried. Other torture tests include shaking, freezing and prolonged exposure to dampness and heat in specially constructed chambers. Although TV receivers may never be subjected to such abuse in the home, most manufacturers make sure that their products will give years of service.

High-speed robot machines that automatically assemble printed circuits equivalent to approximately one half of a television receiver chassis in a matter of seconds, are now in operation in the Admiral Corporation plant. A 30-foot-long battery of complex machines into which electrical components such as resistors and wire jumpers are automatically fed delivers a completely assembled, printed-circuit board. Eight tubes are used in this section, both sides of which are shown by the young lady at the left in photo C. The completed section is displayed at the right.



# CHILDREN'S PLAYROOM PHONO

By Dr. R. C. Hitchcock

**E**NAMELED WHITE and decorated with colorful decals, this easy-to-build phonograph cabinet and amplifier unit will brighten up any child's playroom and provide many hours of entertainment. Built-in record-storage space encourages the child to put away records in a safe place when finished with them. The completed unit shown in photos A, E and F has good-quality output and plays all three speeds.

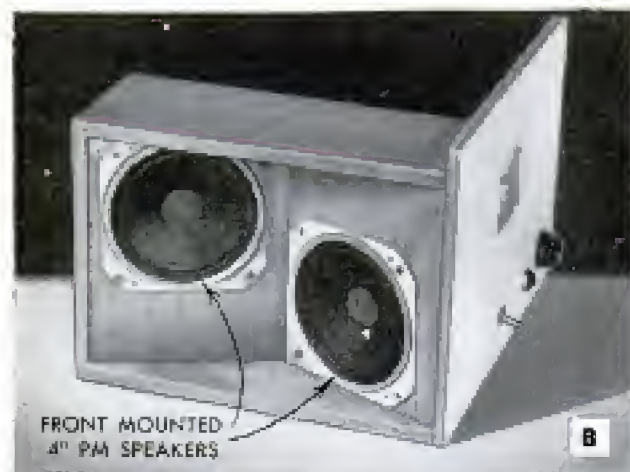
An absolute minimum of tubes is used; a full-wave rectifier 5Y3-GT, a pentode output tube 6K6-GT, and a dual triode input 6SL7-GT. These are all full-sized tubes.

The closed-top cabinet has few dust-collecting surfaces as, for instance, note that grille cloth on the side is mounted flush. The amplifier panel is recessed protecting the knobs and dial-light jewel. Finished, this cabinet is 14 $\frac{3}{8}$  in. high, 13 $\frac{5}{8}$  in. wide and 10 $\frac{3}{8}$  in. deep. It is made of  $\frac{3}{8}$ -in. white-pine plywood and weighs 17 pounds without records. Record sizes up to 10 inches can be played and stored.

The grown-up features, seldom found in a small phono are: All speeds, turnover crystal pickup, power transformer, dial light, twin angled speakers and storage space for records. The turnover crystal pickup is to let your child find out how to work a good phono player, and the way to teach him is with his own instrument. Later you can trust him with your hi-fi job.

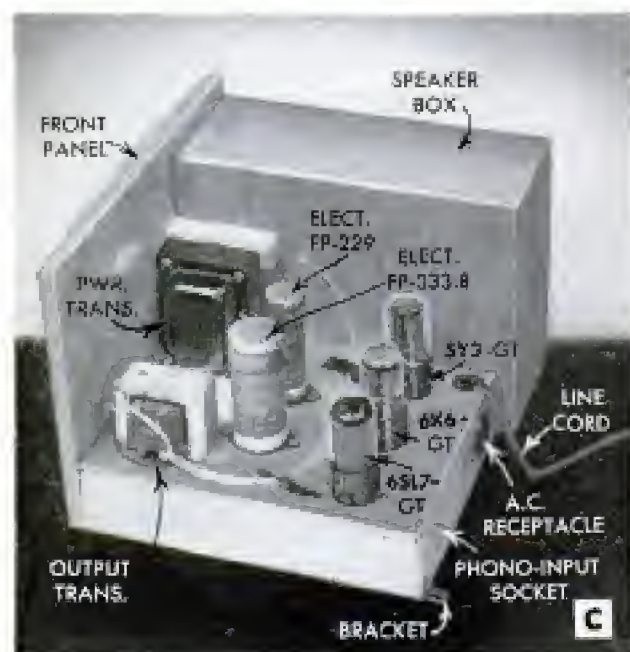


**A**



FRONT MOUNTED  
4" PA SPEAKERS

**B**



**C**



**D**

# HAS GROWN-UP FEATURES

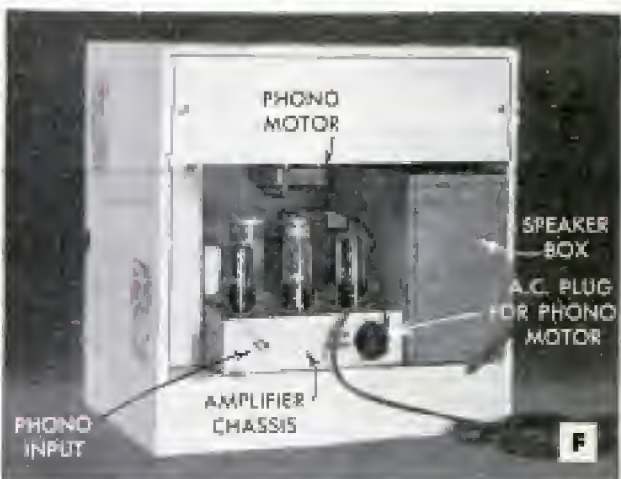


Characteristic of large amplifiers is the power transformer. This also eliminates the shock hazard of transformerless a.c.-d.c. amplifiers. The speakers are angled to provide wide-angle sound distribution, a really unusual feature in a small phono. In the interest of simplicity there is no tone control. The volume control is at the right of the dial light, and the on-off switch at the left. Although no claim is made for high fidelity, as it does not include push-pull output, the output is 1.5 watts at 2.5 percent IMD (intermodulation distortion) which is excellent and enough volume. At 1.8 watts the IMD is 5 percent, which is still good. The chassis base is 2 x 7 x 9-in. zinc-plated steel listed in most parts catalogues for about \$1.00. The power transformer specified has a plate winding of 470 volts center-tapped, 40 ma.; a 5-volt, 2-amp. winding, and a 6.3-volt 2-amp. winding. The h.v. leads are red, and the h.v. center-tap lead is red and yellow. The 5-volt leads are yellow. The 6.3-volt leads are green and the 6.3-volt center tap is double (heavy) green. The exact layout of the chassis base is not critical but should follow photos C and H. In order to provide short leads for minimum hum and feedback, mount the tube sockets for the 5Y3-GT and the 6K6-GT with their keys pointing together. The key of the 6SL7-GT should point toward the front of the chassis.

The Mallory electrolytic condenser units, FP-229 and FP-333.8, are top-mounted. The Bakelite washer is on top of the chassis. Use fillister or round-head screws to hold Bakelite washers—do not use binding-head screws which would ground the condenser-unit can. The common bus wire (heavy black) is bare No. 14 tinned-copper wire. The only place the common bus is grounded is at the phono-input jack. This is automatic as there is a strip of metal on the jack mounting which connects to the chassis as soon as the jack is bolted in place. A complete schematic circuit diagram appears in Fig. 2; all resistor and capacitor values are given.

Use 1/2-in. rubber grommets for the power-transformer leads, and the a.c. line cord. The phono-motor outlet is in use when the power switch is on, and off when the power switch is turned off.

With the use of a Stancor A-3824 output (Figs. 1 and 2 shown on page 164)  
(Text continued to page 236)



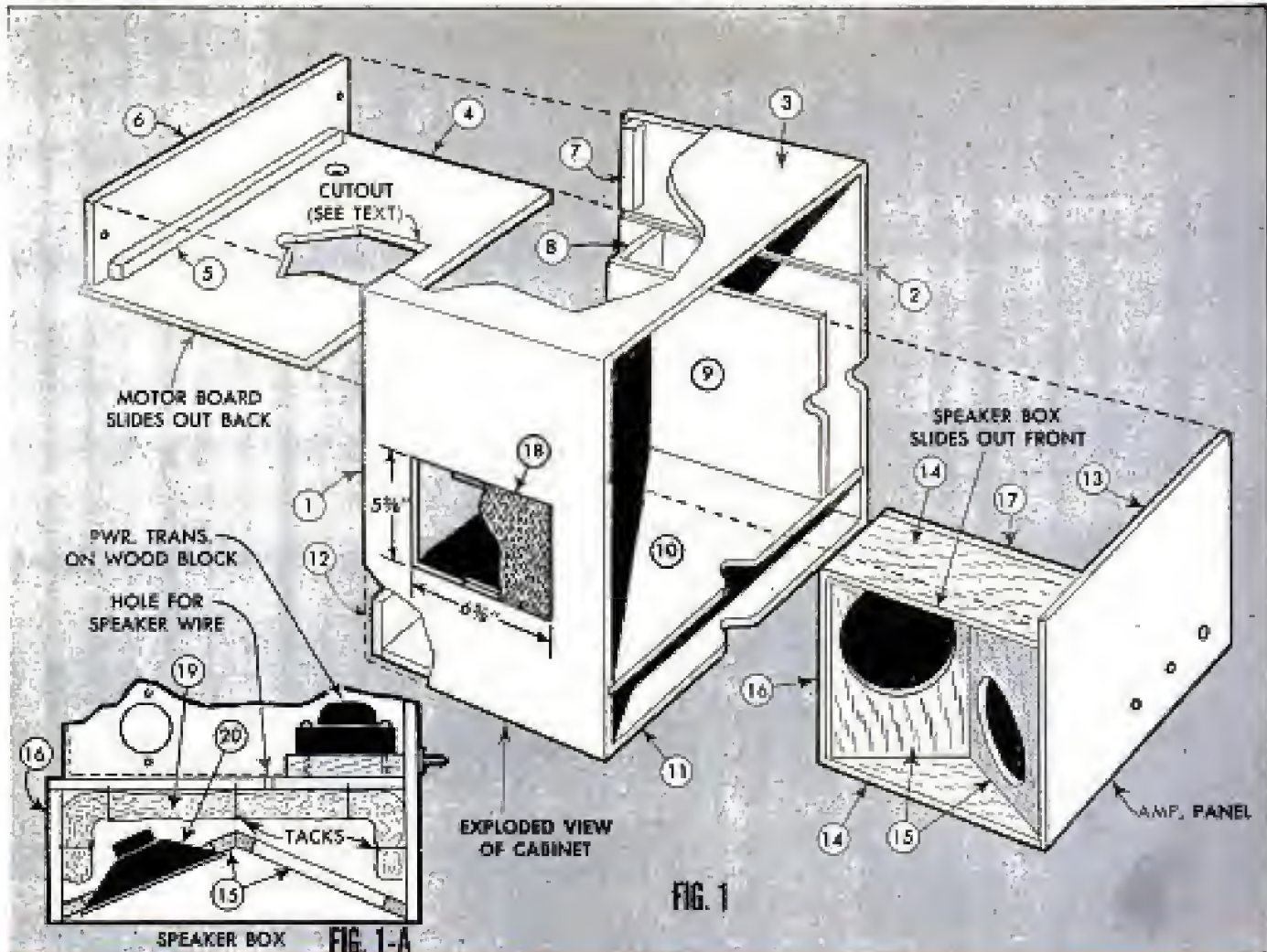


FIG. 1

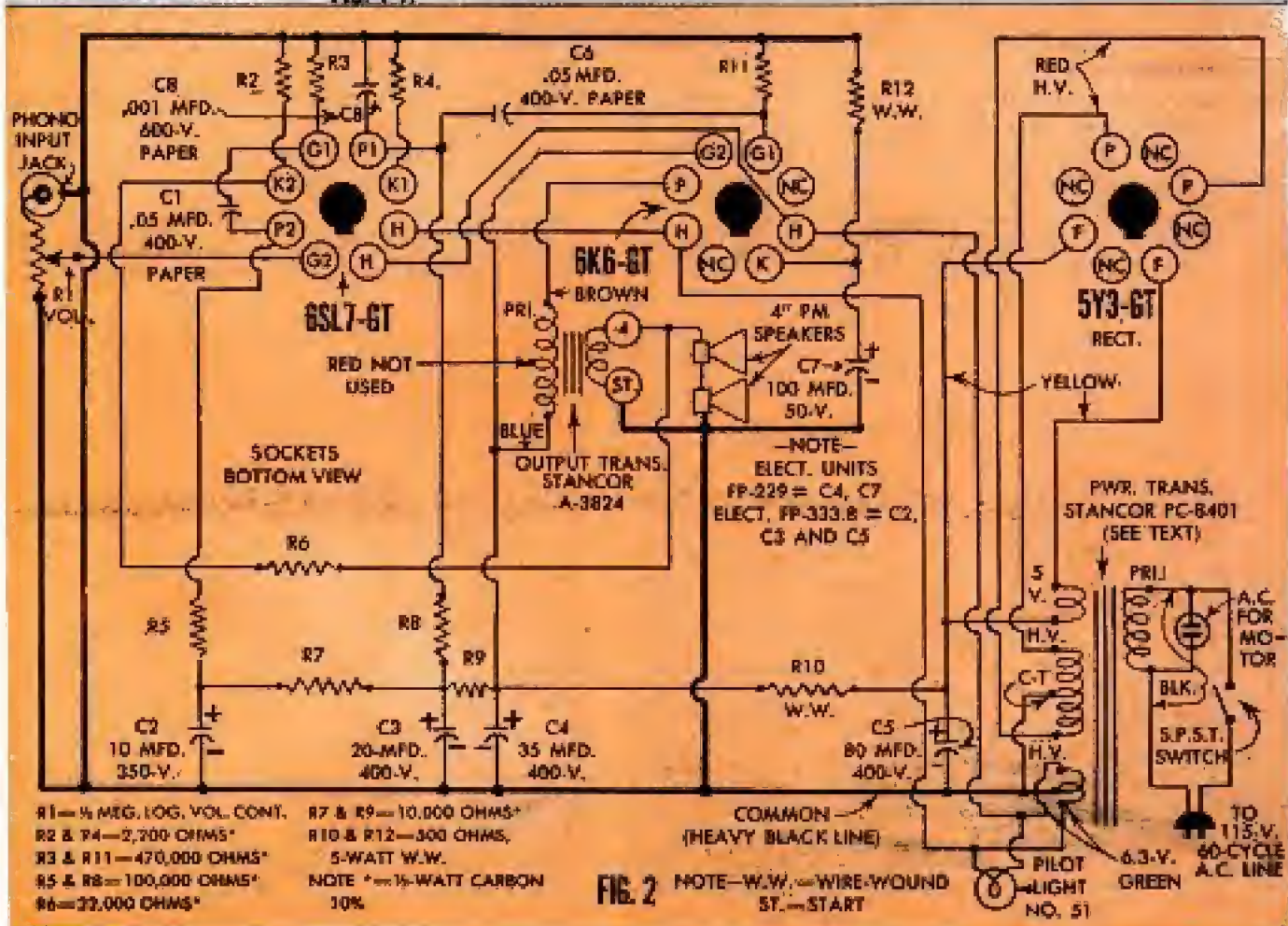


FIG. 2

# the POPULAR MECHANICS CRAFTSMAN

## MODERNIZED FIREPLACE

By A. G. Barows

**D**ONT LET an old-fashioned fireplace discourage you from using modern furniture. We faced this problem and discovered that, with a minimum of cost, we could modernize our fireplace and its bookshelves to blend in with our bleached-mahogany furniture. The finished job, as you can see in the photograph, is very attractive, yet it can be done by the average handy man using a handsaw, a coping saw and a hammer.

If made with expensive wood paneling and marble, the cost of this new mantel would have been prohibitive. But by using ordinary plywood and plastic veneer, I was able to build it for a surprisingly small amount of money. Plastic veneer is a decal type of wood finish which comes in a variety of beautiful wood grains and rare marbles that can be applied over the plywood with little difficulty.

To begin the project, I removed the doors from the old bookcase and filled the screw holes of the hinges with wood putty. The gas heater in the fireplace was removed and the gas pipe capped. Then all the surfaces

This is how the fireplace looked before modernization. The bookshelves on each side were also veneered



It's hard to believe that this lovely modern fireplace was once an old-fashioned brick-and-mahogany installation

of the bookcase were steel-wooled preparatory to applying the plastic veneer.

We retained the knickknack shelf of the old fireplace and built the plain-panel front out almost flush with original top shelf. The entire unit was constructed of economical 1/4-in. fir plywood and 1 x 3-in.

A back view of the front panel of the fireplace shows how panels are braced with 1 x 3 lumber





Above, each section of the front panel should be tried to make certain of the fit for best results



The plastic veneer is cut to size before application, as above. Application is not difficult and, if a little care is used, final appearance is like fine wood paneling. Below, mirror backs up small shelf



lumber. It is best to make the base first, and this is done by building a framework to extend about 6 in. out from the front panel. Then a piece of plywood is cut to the shape of the fireplace floor and the two side panels of the fireplace are cut. These are nailed to the frame and glued at the joints.

The front of the fireplace is made from three plywood panels. The center panel runs from the knickknack shelf to the top of the fireplace opening. The two side panels run from the top shelf to the base. These three panels are butted together and joined across the back with two 1 x 3-in. boards. Two side strips are cut from plywood also and nailed to the completed front panel. A strip of quarter round may be used to brace them at each corner.

The knickknack shelf also is nailed to the front panel. Three pieces of 1 x 3-in. lumber form the trim for the fireplace opening. These are located in place, and holes drilled for them, but are left off until the plastic veneer is applied. All joints in the construction are glued, and all nails are set and filled. The entire unit is then sanded and given two coats of shellac. Then, after being steel-wooled and tried for fit, the fireplace is ready to be covered with plastic veneer.

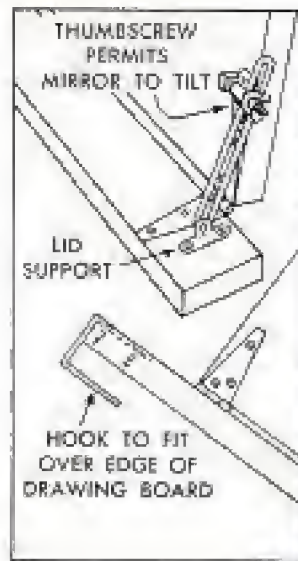
Instructions for applying the plastic veneer come with it, but here are some helpful suggestions: Cut all the pieces of the veneer to size before beginning application. Purchase the slow-setting cement which gives you more time to get it smoothed out. And take pains to see that the finished job is smooth. Coat the finished mantel with clear varnish or lacquer after applying the veneer. Leave the high gloss on the marble veneer, but use steel wool to remove the gloss from the wood-veneer finish to give it a more natural look. ★ ★ ★





# Mirrors Furnish Artist Right or Left-Hand Model

By using two facing mirrors which are hinged to lengths of 2x4, one artist is able to use himself as a model. Depending on which reflection he copies, his own left hand will appear as either right or left hand. Each length of 2 x 4 has a U-shaped bracket made of flat steel screwed to one end. The bracket hooks over the end of the drawing board to support the mirror and permits a quick change of the angle of the mirror. An adjustable lid support allows the mirrors to be set at any vertical angle.



# Modern Wrought-Iron Table Lamp Improvised From Tripod

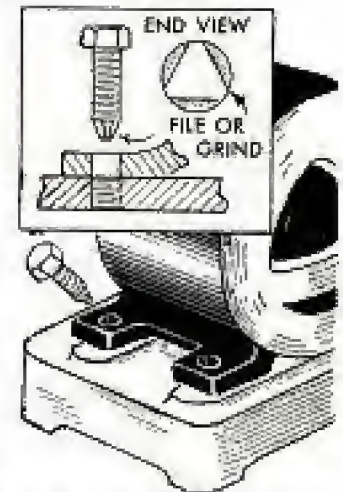
A very attractive modern table lamp, in the popular wrought-iron theme, can be made easily from a photographer's table-



top tripod. First remove the pan head from the tripod and mount a standard lamp socket in its place. The setscrew in the lamp socket is secured to a 1/4-in.-dia. machine screw which is attached to the tripod top. Wire the socket, using a suitable length of lamp cord, and finish the lamp by attaching a clamp-on-type lamp shade, available from most notion stores. For best appearance, paint the tripod a flat black. If desired, you can make your own shade, using the wire frame from an old shade. Cover the frame with any material, such as road maps, unusual wallpaper, etc., to blend in with the decorations in the room in which it is to be used.—John J. Borzner, Fayetteville, N. Y.

# Holes in Motor and Base Aligned By Grinding Points on Bolts

To aid in overcoming the difficulty of aligning bolt holes in motors and machines with the holes in base plates to which they are to be bolted, file or grind a three-cornered point on the ends of the bolts. As the motor is moved, the point will allow the bolt to drop into the hole in the base plate when the holes are aligned.—Hugh Lineback, Stillwater, Okla.

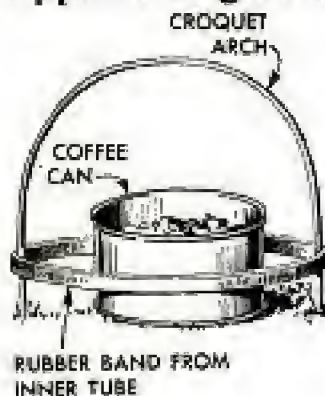


## Potatoes Impaled on Metal Holder Baked Quickly Without Marks



Potatoes are baked quickly and thoroughly with no pan marks when they are impaled on the points of a metal holder that slides into the oven. The holder is a sheet of fairly heavy aluminum into which V-cuts are made with a cold chisel to provide tabs or points. After the points are bent at right angles to the sheet, the chiseled edges are filed smooth and the projections shaped into slightly rounded points. One end of the sheet is bent or rolled to provide a convenient handle.

## Tipproof Dog-Food Pan



A dog will not tip its feeding pan if the pan is anchored with a croquet arch and a rubber band cut from an inner tube as pictured. A 1-lb. coffee can provides an ideal feeding pan as its straight sides are suitable to be retained by the band. An arch shaped from a piece of heavy wire may be substituted for the croquet arch if one is not readily available.

## Weight Helps Car Up Icy Ramp

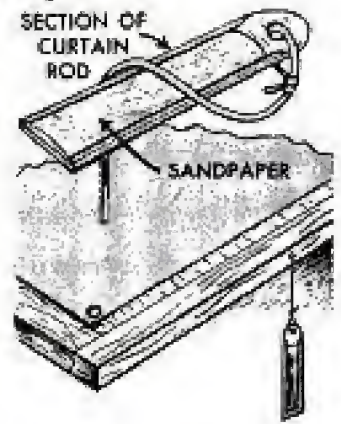
Frequently, even after the main roads are clear, garage ramps and inclined driveways remain coated with ice, making it difficult to put the car in the garage. One

motorist found that by putting sandbags totaling 200 lb. in his trunk and lowering the air pressure in the rear tires to 20 lb., he could back his car up inclined driveways with very little difficulty.

R. E. Hawes, Marietta, Ohio.

## Curtain Rod Provides Holder For Sandpaper Strips

Draftsmen and artists will find that a length of flat curtain rod can be used as a holder for the strips of sandpaper used to touch up pencil points. The strips are cut slightly wider than the rod so they fit snugly inside. A cord passed through a hole drilled in the rod permits it to be hung



at a convenient location along the edge of the drawing board where it will not contact the clothing of the artist.

## Length of Wire Straightened By Using Hand Drill

A length of bent or moderately kinked small-gauge wire can be straightened by gripping one end with a vise and twisting the free end with a hand drill. When the wire is chucked in the drill, pull it to keep it under tension and turn the drill slowly. As soon as the wire is straight, loosen the chuck, pull away the drill, then remove the other end from the vise. Wire heavier than No. 12 gauge is too difficult to straighten by this method as a higher tension and turning force are required than can be applied with a drill.



When making brooches or other jewelry having a pin back, place the pin back above center so the piece will hang flat and not tip out at the top when worn.



## CHRISTMAS CANDLE

GREET YOUR GUESTS and extend holiday salutations to passers-by with this giant glowing candle outside your front door. The cheerful glow is provided by tubular lamps in the flame and inside the red plastic body of the candle. Construction is not difficult. First, a framework is built, then the electric wiring is installed and, finally, the outer covering is applied.

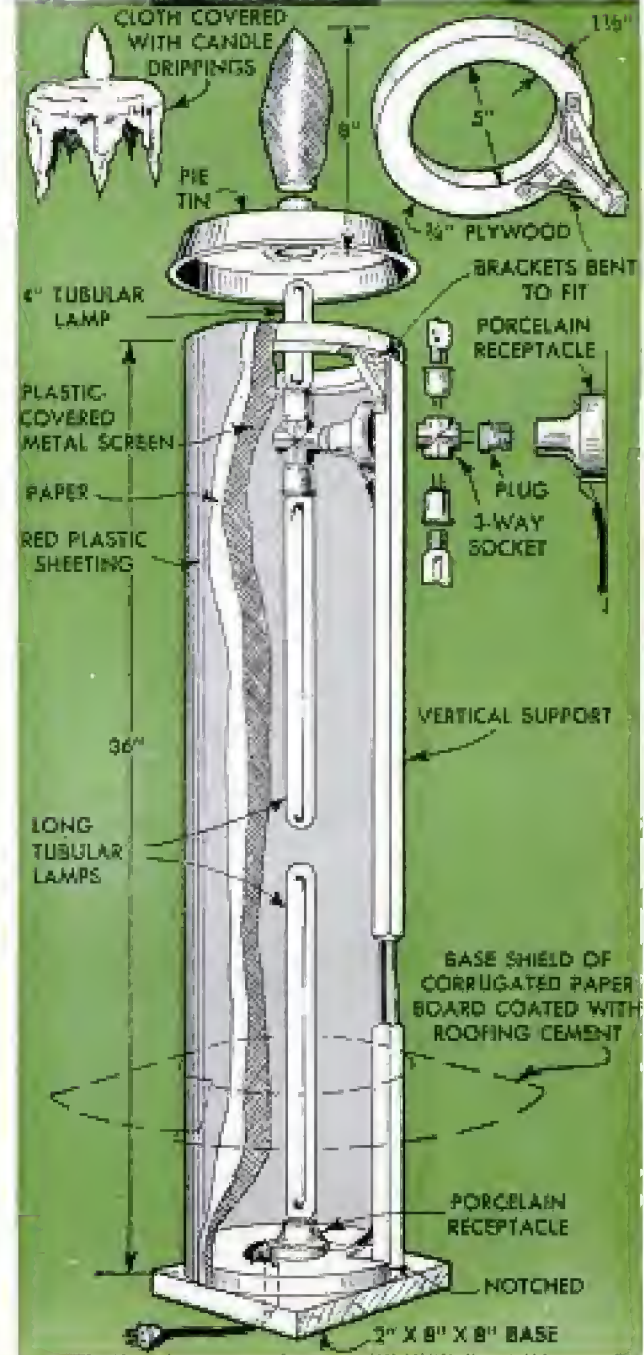
The bottom of the candle framework is an 8-in. disk screwed to an 8 x 8-in. block of 2-in. lumber. Vertical support for the top ring of the frame is provided by a 2 x 2, 35 1/4 in. long, which fits in a notch cut in the edge of the disk. Both disk and ring are fastened to the support with angle brackets.

Two porcelain receptacles are used in the wiring of the candle. One is screwed to the center of the disk, the other to the vertical support. The latter receptacle is fitted with a plug, a 3-way socket and two adapters to hold the upper lamps.

The outer covering of the candle consists, first, of a layer of plastic-coated metal screen which is covered with wrapping paper. A piece of red plaster sheeting is thumbtacked over the wrapping paper.

The top of the candle is a pie tin in which a hole is cut for the top lamp. Plastic-coated screen is formed into the shape of a flame, then is covered with several layers of glue-coated, red tissue paper.

The candle drippings are made by draping an irregularly cut piece of cloth over the pie tin and slowly pouring melted paraffin over it. The base shield of the candle is a collar cut from corrugated paper and coated with roofing cement.





Super photo



Westinghouse photo



Frigidaire photo

# WHAT YOU SHOULD KNOW ABOUT CLOTHES DRIERS

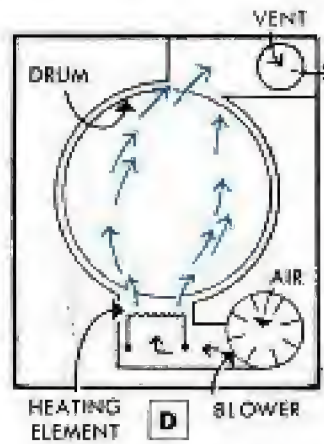
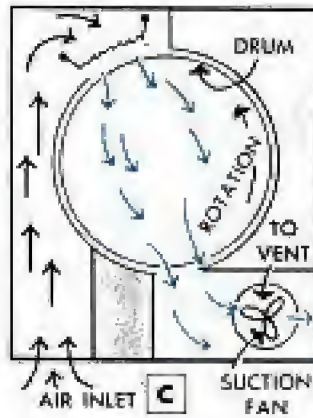
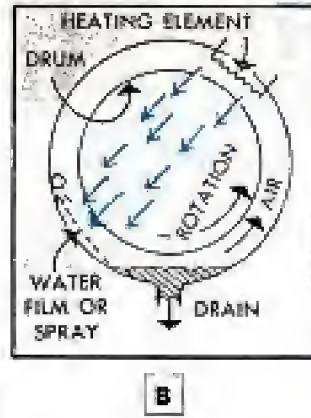
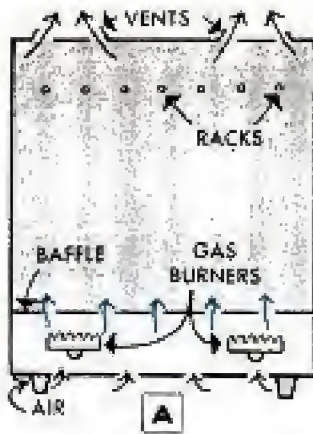
By John B. Mullen



Refinator photo



Sarge photo



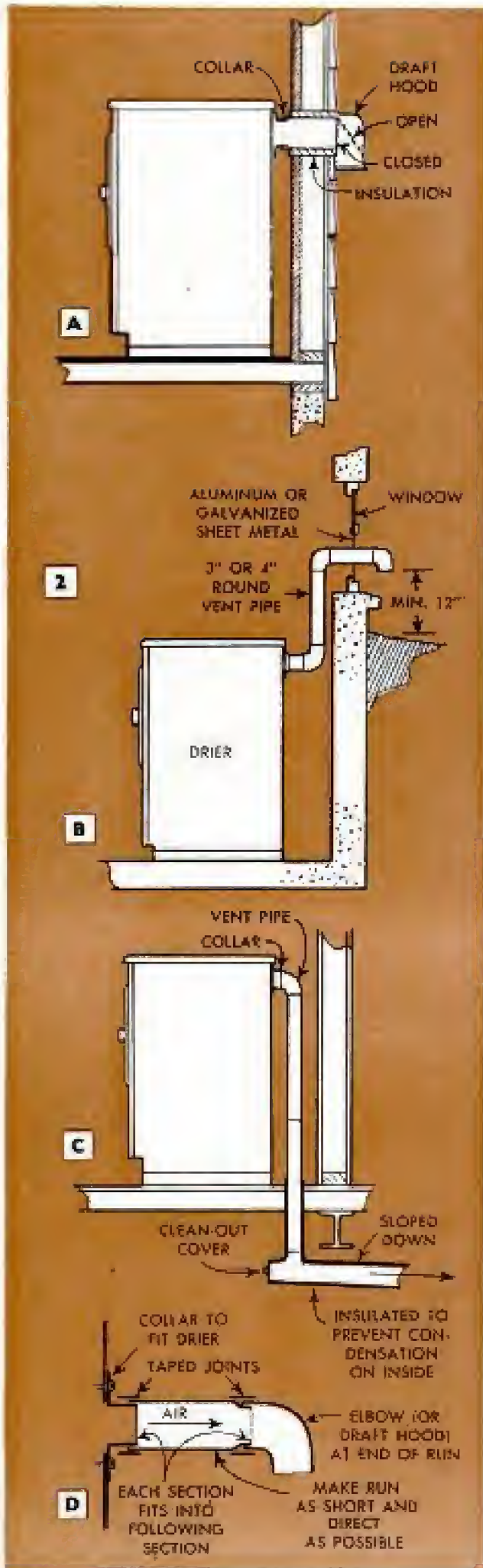
**ARE YOU IN THE MARKET** for an automatic clothes drier? Like shopping for a new car, you'll find an array of gleaming models boasting exclusive features from built-in sun lamps to musical timers. Knowing the various types on the market, how they work and are installed will be helpful in making your selection when you head for the appliance department. The three general types are pictured in Fig. 1; condenser type, B, suction type, C and forced-air type, D. Early type gas-heated drier, A, which circulated warmed air by convection only, is a system no longer used in modern domestic driers.

**Condenser driers:** In condenser driers of the air-condenser type, the clothes are tumbled and heated in a perforated cylinder and, as the water is converted to vapor it escapes through the condensing system. Here the hot, moisture-laden air passes through a series of tubes cooled by fan-circulated air on the outside. The moisture condenses on the tubes, carrying with it whatever lint is carried out of the cylinder, while the condensed water collects in a pan at the bottom. This must be removed and dumped after each load, or the water can be piped to a floor drain if desired. The air condenser extracts over half of the moisture from the air leaving the drying chamber, the balance being mixed with the air that cools the condenser and blown out into the room.

In condenser driers of the water-con-

denser type, the moisture-laden air from the cylinder is cooled by passage through a stream or spray of cold water which extracts the moisture and the lint. The water-condenser type, of course, requires both a supply pipe for water and a connection to the drain. There is a sump pump for discharging the water in case a floor drain isn't available. Such driers require about 15-20 gal. of water per cycle to operate. Although the clothes in a condenser-type drier are continually tumbled, the air circulation is produced by convection and by the escape of vapor-saturated air to the condenser; on the other hand, because the movement of air is at a minimum, they never require venting. This convenience is partly offset by the nuisance of emptying the drip pan after each load or by the requirement of a drain and water supply.

**Suction driers:** Most driers depend on movement of warm air for their action, although in some the gas or electric heater is placed adjacent to the drum so there is some direct heat applied to the cylinder as well. Usually the air blower is near the vent so that the air is under suction as it passes through the drum. Some driers provide an adjustable temperature control, allowing the operator to preset the degree of heat as well as the drying time. This permits using a low temperature for delicate fabrics, and higher temperatures for faster drying of cottons. Other suction-type driers have a preset operating temperature



**A** Short, direct line through outside wall is best installation. Draft hood keeps out cold and rain

**B** Driers in basements can be vented through a nearby window by replacing a pane of glass with sheet metal. Elbow may be used in place of draft hood

**C** Installations on inside wall in kitchen or utility room can be vented to outside through basement. Vent pipe should be insulated to prevent condensation where basement or crawl space is not well ventilated

**D** All vent pipes should be made as short and direct as possible. See that there are no obstructions in the vent pipe that would catch and accumulate lint

which is roughly equivalent to the low temperature of the adjustable types. This has the advantage of simpler operation and eliminates any danger of overheating delicate textiles by forgetting to reset the thermostat. Usually, these driers circulate a relatively large volume of air. The construction and path of air circulation of one drier of this class is shown on page 173.

Besides the suction-type driers that draw warm air through the clothes, there are a few driers that operate with the blower fan or turbine on the intake side and blow the air through the clothes. These move a somewhat larger volume of air at somewhat lower temperatures than other types, which is claimed to give the closest approach to natural drying conditions and the least possibility of overheating or "cooking" the clothes. Air temperature in these machines is preset so they have the added convenience of simpler control, and no chance of damaging delicate fabrics by forgetting to turn the thermostat to "low."

Cutaway view of air-condensing-type drier. Heated moist air from drum is drawn out through tubes of condenser where over half of water is condensed to collect in drip pan. Tubes of condenser are cooled by room air drawn in through the right-hand grill



**Venting:** All driers of the warm-air type have an outlet, or vent, from which the moisture-laden warm air is blown out into the room. Usually this is located on the back, occasionally on the top. However, discharging upwards of 3000 cu. ft. of warm, humid air into a room may steam up windows or cold surfaces, sometimes makes the room uncomfortably warm, and may even make the air in the room humid enough to slow down the action of the drier. For this reason, most manufacturers recommend venting the drier to the outside. This is easily done by fitting a 3 or 4-in. pipe, depending on the make of drier, to the exhaust opening from the drier. Vents should be as short and direct as possible. Some methods of venting are shown in Fig. 2. A draft hood will prevent rain, snow and cold air from entering the vent when the drier is not operating.

**The lint problem:** The amount of lint removed from a batch of clothes always surprises a person when they first use a drier. However, the lint is not caused by the action of the drier, but rather by normal wear on the textile fibers and by the washing. The same amount of lint is removed

Cutaway view of suction-type warm-air drier. Warm air flows from intake at top, through drum and lint screen, then to blower and out vent at the rear



## SPECIFICATIONS DOMESTIC CLOTHES DRIERS

Code No.	MAKE	Type *	RATING			DIMENSIONS		Drum Size (cu. ft.)	Capacity (lb. dry)	Time Range	Thermostat P—Preset A—Adjustable	Motor Hp.	Fan c.f.m.	FEATURES					Other	
			Electric		Gas BTU per Hr.	36" Height Is Standard								Signal End of Time	Shut Off When Dry	"Sun" Lamp	"Safety Door"	Drying Without Heat		
			Watts @ 230 v	Watts @ 115 v		Width	Depth													
1	Frigidaire	AC	4400	1550	—	30	26½	5.7	8	85	A	1/6	—	—	—	—	—	—	—	—
2	Hotpoint	WC	4700	—	—	31	28½	4.8	8	90	A	1/6	—	—	—	—	—	—	—	—
3	Maytag	WC	4800	—	—	31½	26½	5.2	9	110	A	1/6	—	—	—	—	—	—	—	—
4	ABC	VA	4400	1300	18,000	30	26	6.0	9	20	P	1/6	122	—	—	—	—	—	—	—
5	Apex †	VA	4600	—	15,000	30	24¾	5.1	8	60	P	1/6	—	—	—	—	—	—	—	—
6	Bendix	VA	4700	1450	19,000	30	26	5.8	9	75	P	1/3	120	—	—	—	—	—	—	—
7	Blackstone	VA	4600	—	18,000	29	25	—	9	90	A	1/6	—	—	—	—	—	—	—	—
8	Easy	VA	4500	—	15,000	29¾	25½	5.1	9	180	A	1/4	90	—	—	—	—	—	—	Lint-Signal
9	General Electric	VA	4700	1400	—	31	26½	—	9	140	P (2)	1/6	100	—	—	—	—	—	—	Sprinkler
10	Hamilton †	VA	4700	1600	18,000	31	26¾	5.3	8	130	A	1/6	—	—	—	—	—	—	—	—
11	Kelvinator	VA	4800	1700	—	30	27	—	9	120	P	1/6	120	—	—	—	—	—	—	—
12	Roper	VA	—	—	18,000	31	26	—	9	120	P	1/4	100	—	—	—	—	—	—	—
13	Speed Queen †	VA	4500	—	18,000	30	26	5.3	8	120	A	1/6	—	—	—	—	—	—	—	—
14	Temea †	VA	—	—	15,000	30	25	5.0	8	120	P	1/4	—	—	—	—	—	—	—	—
15	Ehor †	VA	4500	—	—	30	26½	—	8	(1)	P	1/6	90	—	—	—	—	—	—	—
16	Whirlpool	VA	4200	—	20,000	29	25½	5.2	10	60	A	1/6	80	—	—	—	—	—	—	—
17	Norge	PA	4200	1100	18,000	31	26¾	6.0	9	120	P	1/3	150	—	—	—	—	—	—	Can dry with- out tumbling
18	Westinghouse	PA	4600	1500	—	31	27	—	9	180	P	1/6	125	—	—	—	—	—	—	—
19																				
20																				

†—DID NOT SUBMIT DATA  
\*—TYPES:

AC—AIR CONDENSER  
WC—WATER CONDENSER

VA—VACUUM AIR  
PA—PRESSURE AIR

(1) CONTROLS DRYNESS, NOT TIME  
(2) THERMOSTAT PRESET, BUT  
POWER INPUT ADJUSTABLE



Frigidaire photos

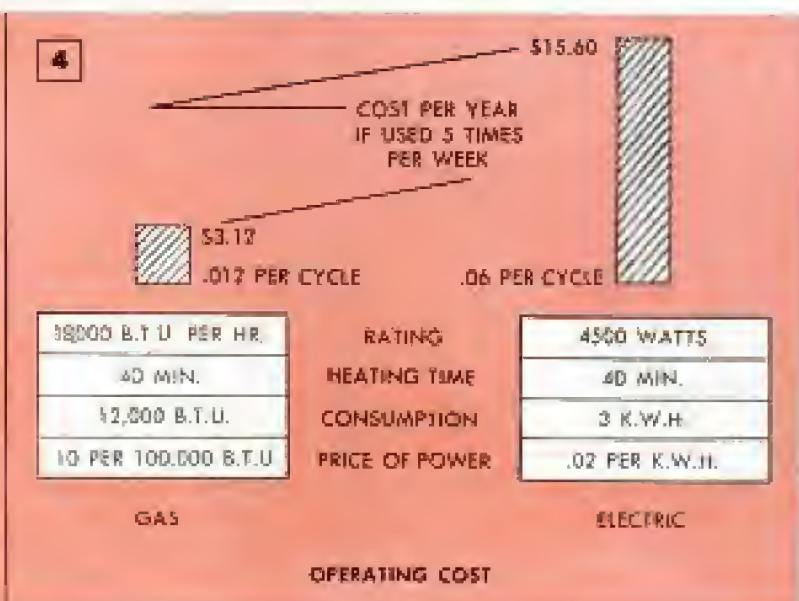
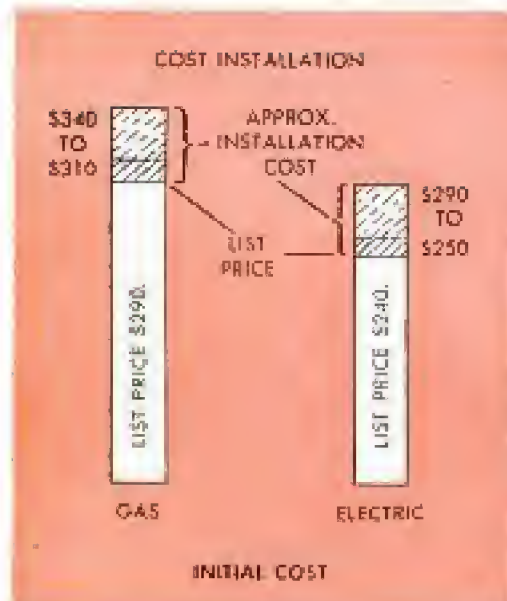
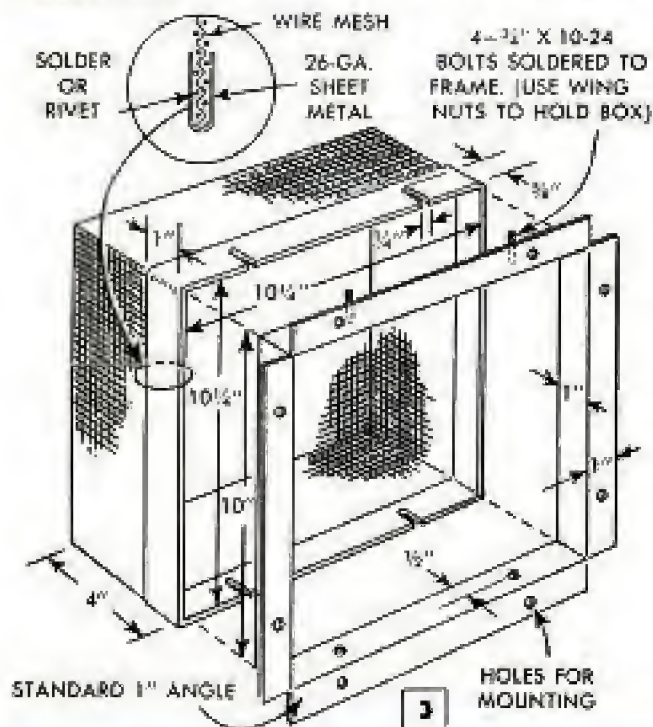


Above, lint screen of warm-air drier should be cleaned after each use. Left, lint is removed from condenser of air-condenser drier by flushing with water

from clothes dried outdoors, but it blows away so it is never noticed. All driers of the air-circulating type provide a lint trap located in a drawer or compartment near the vent. This should be cleaned out regularly, usually after each use. Naturally a lint trap with a large area will impede air flow less than a small one. Lint traps are sometimes removed permanently when an outside vent is used. However, if the discharge is near shrubs or a window, this requires putting a screened lint box over the outside vent, as shown in Fig. 3.

Driers of the water-condensing type eliminate the lint problem almost completely by discharging the lint down the drain with the cooling water. With driers of the air-condenser type, the lint collects on the condenser which must be removed and cleaned like the lint trap in other driers. However, this usually means just a thorough washing under a faucet.

**What clothes can be dried?** Most clothes that can be laundered can be put through a drier. A brief chart listing a few of the types of fabrics and the problems they impose is given on page 175. One absolute





"don't" is this: Home-dry-cleaned garments *must* not be put in the drier because of the danger of fire.

**Special features:** Nearly every manufacturer has a few special features, some of which may appeal to you and influence your choice. About half of the makers provide a "safety door" feature so that heat and drum rotation stop if the door is opened during a cycle to check progress of drying. Most driers have an interior light, and many of them also have a sun lamp as either an extra or standard feature. This gives the clothes an ultraviolet, or ozone, treatment to eliminate any "cooked" odor. An attractive feature offered by two models is a control that shuts off the drier when the clothes are dry, thus preventing over-drying which tends to give the clothes a harsh, stiff feel. One drier has an attachment for sprinkling the clothes while tumbling. The same drier allows drying without heat or tumbling.

**Care and maintenance:** Here, as on most domestic appliances, manufacturers have outdone themselves in simplifying problems. Motors are permanently lubricated and require no attention. Bearings on the drum supports may require lubrication once a year or so. Apart from keeping the machine clean and caring for the lint trap, there's little additional maintenance.

**Installation:** Driers should be leveled but need not be fastened down. Gas models usually require a  $\frac{3}{8}$ -in. supply pipe and shutoff valve, while electric models for 230-volt operation should have a three-wire independent circuit with No. 10 wire. A disconnecting switch with fuses according to manufacturers' recommendations should be provided. Driers can either be connected directly to the line with conduit or cable, or connected to a 3-pole outlet with a pigtail connector such as is used on electric ranges. Some electric driers can be plugged into a 115-volt circuit, provided it is wired with No. 12 or larger wire fused

	RECOMMENDED			Caution Required	Not Recommended	No
	No Special Precaution	Special Methods Req'd.	Short Time and/or Low Heat			
Cotton	■					
Linon						
Wool Blankets	■					
Knit Wool					■	
Other Wool				▨	■	
Silk			▨			
Rayon			▨			
Nylon, Orlon, Etc.			▨			
Knit Cotton				▨		
Rubberized Fabric		■	▨		■	
Plastic		■				■
Feather Pillows	■					
Foam-Rubber Pillows				▨		■

for 20 amps., and provided no other equipment is on the same circuit at the same time. Drying time will be two to three times as long on 115 volts as on 230 volts.

**Gas or electric:** There's not much to choose in operation between the gas and electric drier. In fact, in models that include both types, the only difference is in the heating unit itself and the controls. Apart from the question of availability of adequate gas or electric power, however, there is a difference in cost. The electric drier is less expensive but the gas drier will cost appreciably less to operate. The costs given in Fig. 4 are average for de luxe models. Stripped-down electric models range from \$170 to \$200; gas models with pilot light instead of automatic lighting cost about \$260. ★ ★ ★

## Pencil Attached to Doorbell Permits Fast Stippling



DECEMBER 1954

An automatic stippling device, improvised by attaching a pen or pencil to an ordinary doorbell, will reduce the time required by an artist to stipple a drawing. Remove the bell and frame of the doorbell unit, leaving just the vibrator, bell clapper and arm. Cut off the clapper and straighten the arm. Then solder a short length of metal tubing, slit lengthwise to hold a pen or pencil, to the arm. Some adjustment of the electric contacts may be necessary to obtain the best operation. Also, practice will be required to determine the right spacing between the paper and pencil and the speed of the pencil across the paper.

175

## Timer Trips Shutter of Camera For Taking Self-Portraits



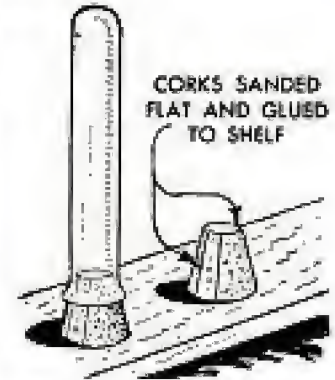
For taking self-portraits, one photographer improvised a timer for tripping the shutter on his camera by remote control. He tied a 1-oz. fishing sinker to a 6-ft. length of light fishline, and linked the fishline to

the arm of his timer with a rubber band. With the timer placed on the floor alongside the tripod, the fishline is draped across the shutter release like a pulley. When a picture is to be taken, the timer is set and, when it rings, the fishline rides over the shutter release smoothly, actuating it without jerking or vibration. There is no possibility of damage to the shutter, and no adjustment for tripod height is needed.

Ivan Grosvenor, Indian Rocks, Fla.

## Test Tubes Inverted on Corks Dry Without Clouding

To drain and dry washed test tubes so they do not become clouded with moisture, and are dust-free when used again, one laboratory worker inverts them over corks glued to a convenient shelf. The corks are

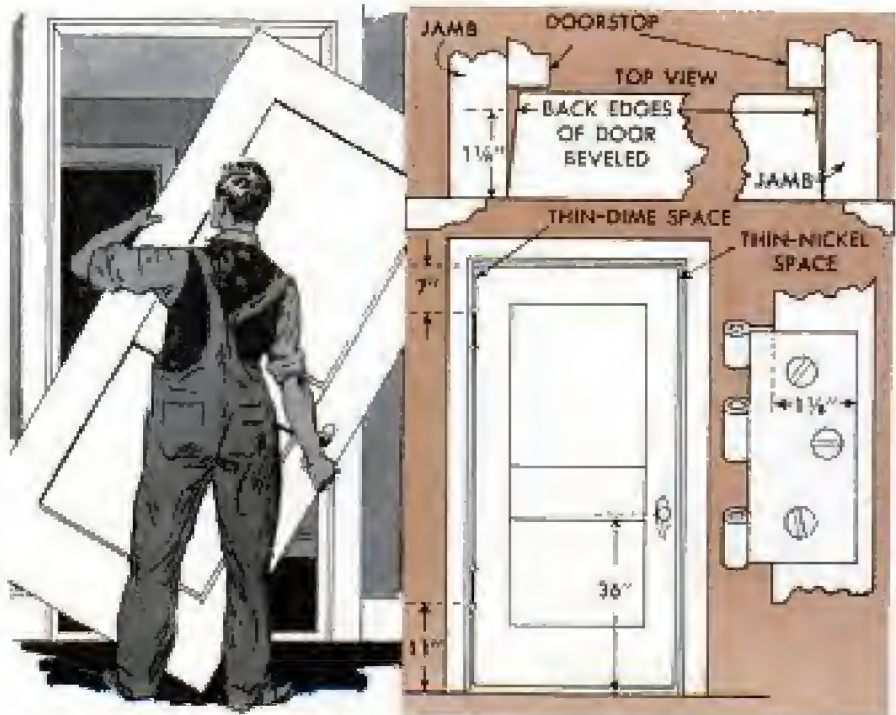


sanded flat on two sides to allow the moisture to drain away and air to circulate inside the tubes. Several sizes of corks are used to accommodate various sizes of test tubes. The corks can be shellacked to make them waterproof.

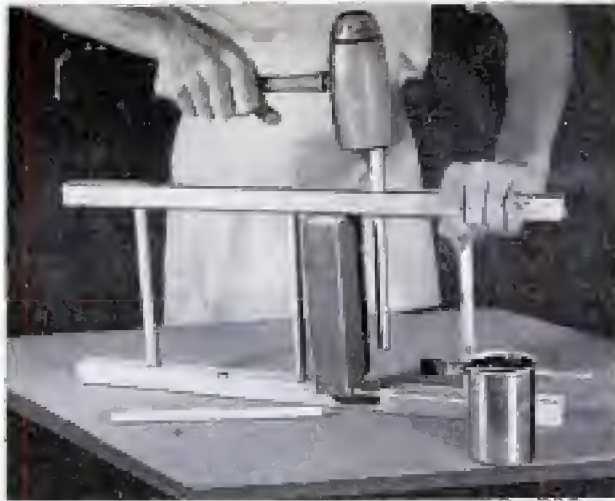
## Coins Serve as Gauges to Mark Clearance When Hanging Door

After a door has been trimmed to fit snugly in its frame, the thicknesses of worn coins can be used to determine the required clearances. A thin dime is used as a gauge to mark the top and hinge sides and a worn nickel is used for the lock side. Remove the door from the frame and plane down to these marks, beveling the back edges of the two sides. Mortise the door for the hinges, setting the upper hinge 7 in. from the top of the door and the lower hinge 11 in. from the bottom. Mortise the doorframe and install the other half of the upper hinge  $7\frac{1}{8}$  in. from the top of the frame. This will give  $\frac{1}{8}$ -in. clearance at the top when the door is hung. Now hang the door on the top hinge and mark the frame for the lower hinge. With both hinges installed,

hang the door and mark any tight spots to be planed for the final fit. The doorknob should be installed about 36 in. from the floor.—G. A. Schoenfelder, Amana, Iowa.



WTM 56

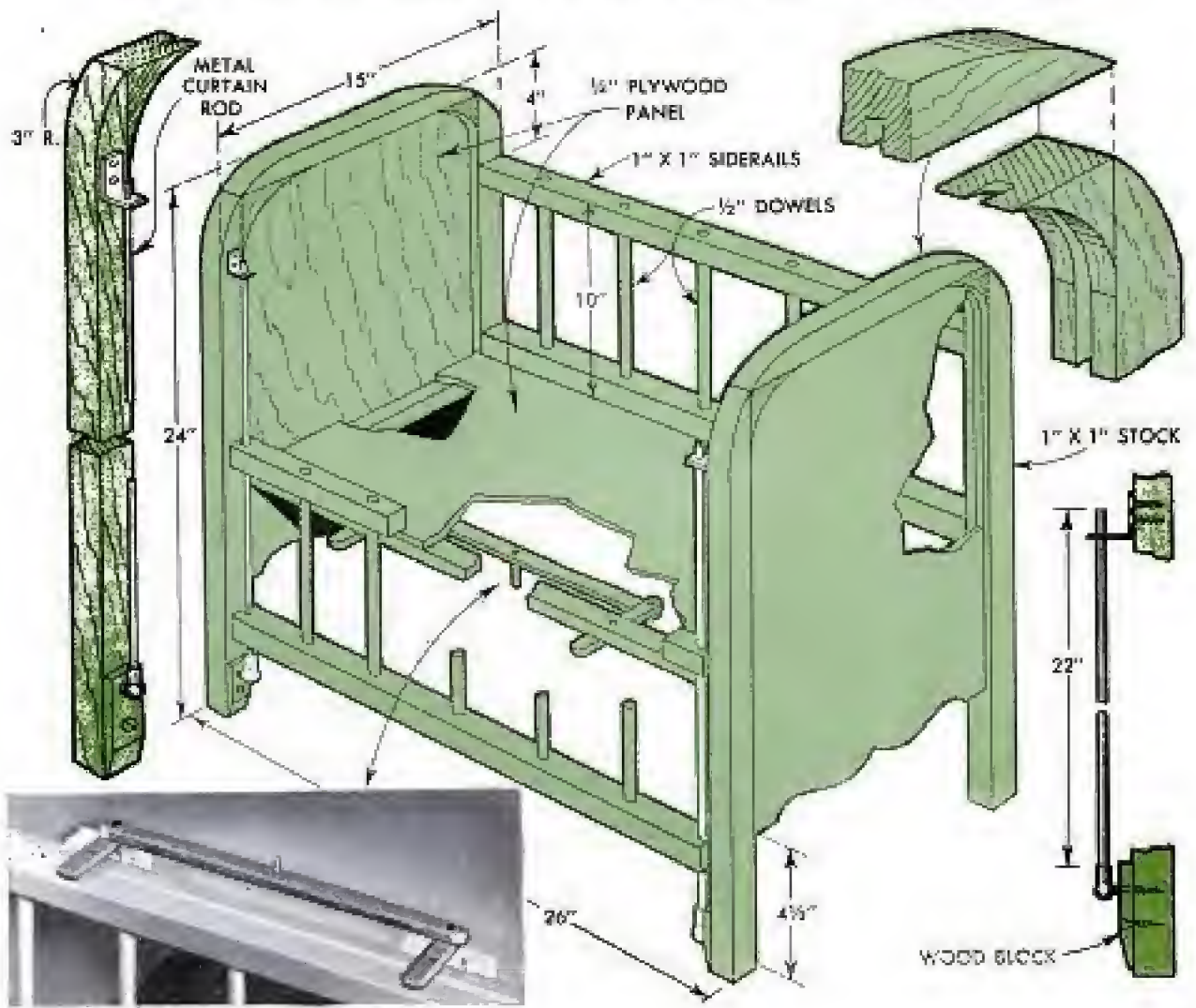


The two sides are identical and are made by driving pieces of 1/2-in. dowel through two rails made of 1 x 1-in. stock. Scrap of wood holds rails apart



# DOLL CRIB WITH DROP SIDE

When it comes time for the little girl in your house to put her dolls to bed, she'll love doing it in this crib that is a model of the real thing. Sturdily constructed of plywood set into grooves in a frame of 1 x 1-in. stock, it has a drop side that slides up and down on metal curtain rods secured to the head and foot. Two hardwood turn buttons operated simultaneously by a dowel handle firmly support the drop side in the raised position

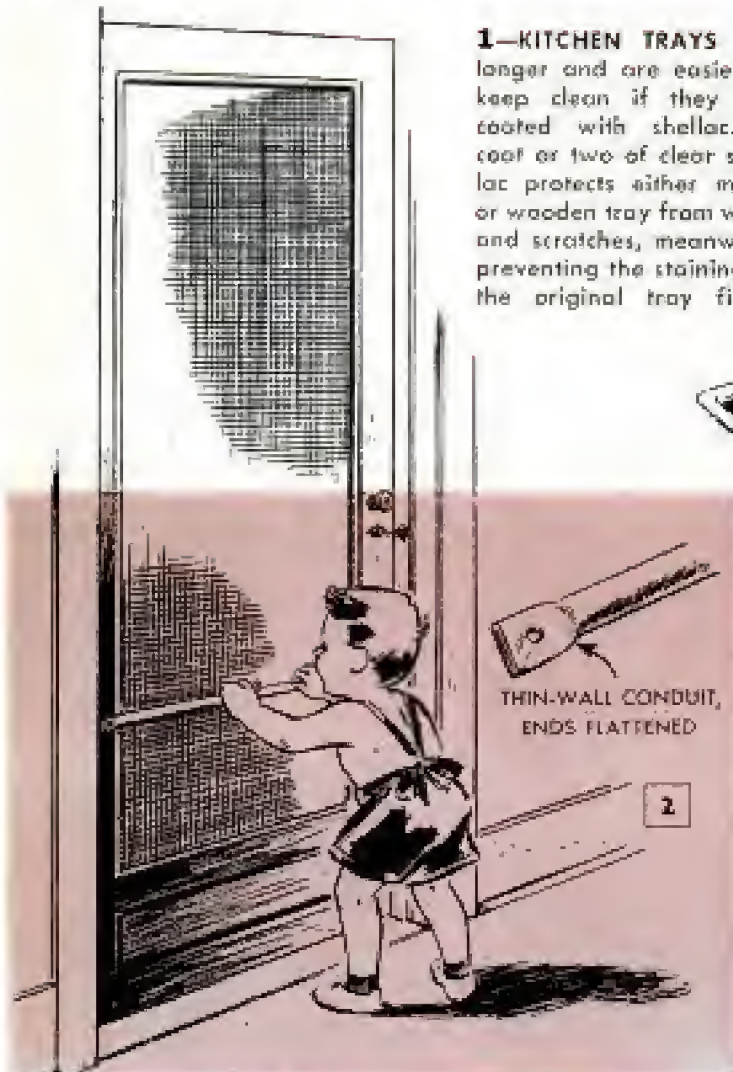


# Solving Home Problems

**1—KITCHEN TRAYS** last longer and are easier to keep clean if they are coated with shellac. A coat or two of clear shellac protects either metal or wooden tray from wear and scratches, meanwhile preventing the staining of the original tray finish

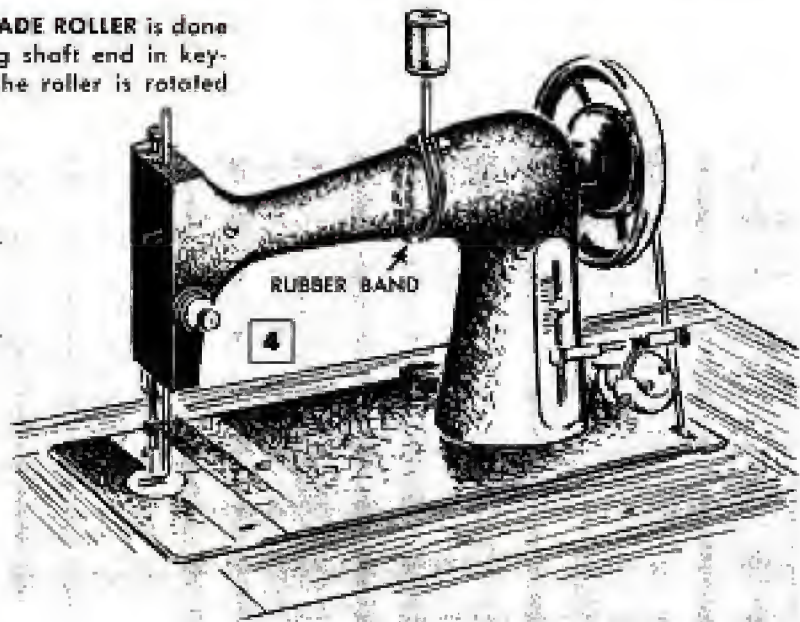
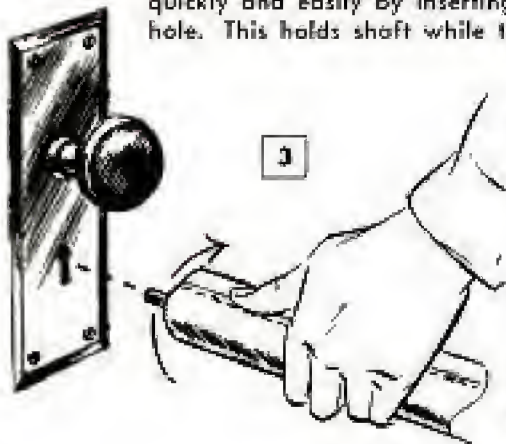


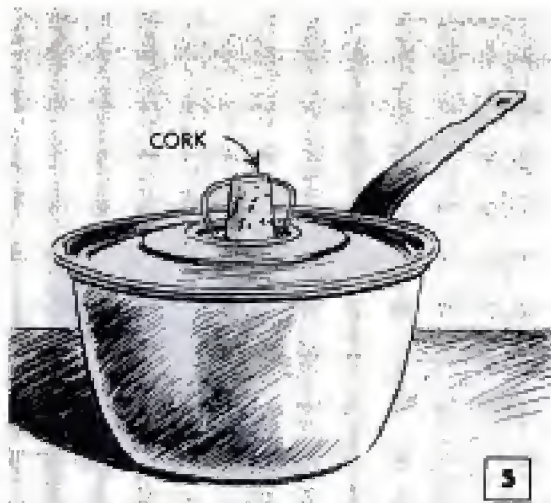
**2—SCREEN DOOR** will be protected from damage by small children if the lower portion of the door is fitted with one or more guards which also serve as handles. The guards are lengths of thin-wall conduit fastened horizontally across screened section



**4—WINDING BOBBINS** on the sewing machine often will cause a spool left on the spindle to rotate and tangle the thread. To prevent this, wrap a rubber band around the arm of the machine, thus providing sufficient friction to keep spool from spinning too fast

**3—REWINDING WINDOW-SHADE ROLLER** is done quickly and easily by inserting shaft end in key-hole. This holds shaft while the roller is rotated

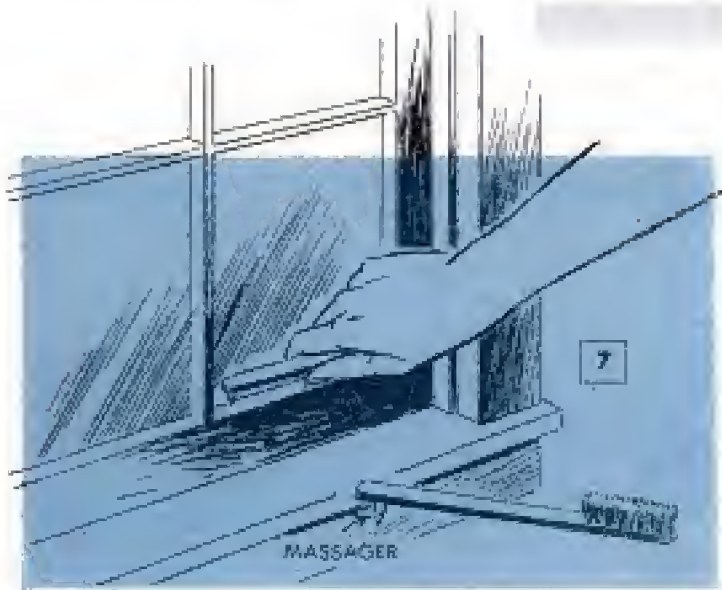




**5—SMALL CORK** holds ring-type pot lid handle vertically to keep it from becoming too hot to pick up. Top and bottom of cork are grooved so one end will rest over raised portion of lid and other end will engage the ring



**6—PROTECT WAXED FLOORS** from being marred by legs of chairs, tables and other furniture by applying a coat of paste wax to the ends of the legs before replacing the furniture in the room



**7—TOOTHBRUSH** of the type having a massaging tip comes in handy for cleaning dust from hard-to-reach corners. Tapered rubber tip is easy to work into windowpane, door-panel molding

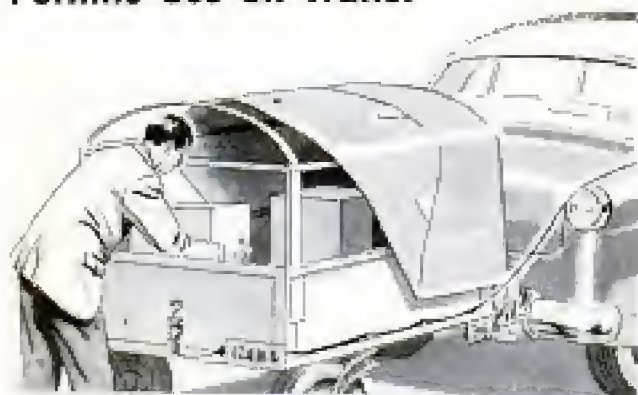
**8—WHEN CARVED MOLDING** on fireplace mantel becomes chipped or broken, it often can be repaired with wood putty. Work putty to shape of molding and finish to match the mantel

**9—SLIDE FASTENERS** on children's garments which are not provided with locking tabs frequently work open. To prevent this, lock in place with an ordinary safety pin inserted from the inside of the garment so that it will keep the fastener slide from moving downward

**10—THREAD** used when basting cotton material does not have to be pulled after sewing if nylon basting thread has been used. When ready to remove the basting, simply press this portion of the material with a hot iron. The heat from the iron will destroy the nylon completely



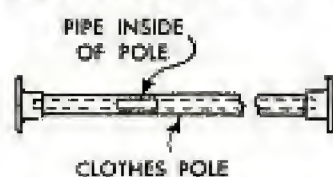
## Extension for Trouble Light Permits Use on Trailer



An auto trouble light, of the type that plugs into a cigarette lighter, can be modified so that it may be extended for use as an emergency taillight on a trailer. As shown in the photo detail, the cord is cut about 6 or 8 in. from the light and the cut ends are fitted with male and female sockets. A length of lamp cord is fitted with sockets in the same manner, so it can be used to lengthen the extension. The extension also will allow using the trouble light anywhere around the outside of the car.

Tom Riley, Portland, Ore.

## Sagging Tube-Type Clothes Pole Reinforced With Pipe



Tubing-type clothes poles that sag under the weight of many garments can be reinforced by inserting a length of pipe inside the tubing.

The pipe should be long enough to be supported by the end brackets, and of the largest diameter that will fit inside the tubing.—Andy Vena, Philadelphia, Pa.

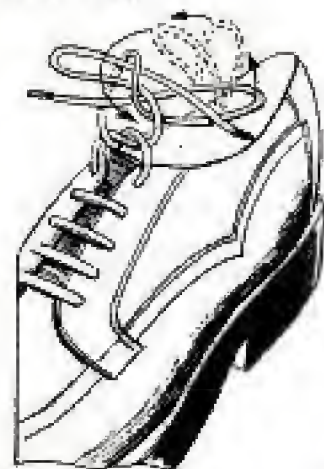
## Silk Stocking "Shoehorn" Used When Donning Snug Boots

To overcome the difficulty of pulling snug-fitting rubber boots over heavy socks, one fisherman uses a silk stocking in much the same manner as a shoehorn. The stocking is slipped down part way into the boot so that its smooth surface can facilitate

sliding the heel of the foot into the boot. After the foot is all the way in, the stocking is removed easily by pulling on the free end.

## Extra Turn in Shoelace Knot Prevents Easy Loosening

If you have the problem of frequently retying a small child's shoelaces, here's a simple trick that will save your time and temper. After tying a regular bow-knot, bring the last loop through twice as shown in the detail, and pull the knot tight. The knot will not work loose and can be released by pulling one of the lace ends in the usual manner. To prevent the child from accidentally pulling the lace ends, tuck them under the lacing.



## Enlarged Screw and Bolt Holes Repaired by Wooden Dowels

The difficulty of resetting or keeping the screws tight on old furniture because the screw or bolt holes are enlarged from years of use may be overcome by plugging them with dowels. To do this, drill out the hole to take the dowel tightly. Cut the dowel so it will come flush with the surface of the wood, then coat it with glue and tap it in place. Sand the end of the dowel and surrounding wood while the glue is still wet. The sanding dust and glue will act as a filler for small irregularities. After the glue is completely dry, relocate the holes and drill as though it were the original wood.—R. F. Donovan, Guttenberg, N. J.



# EARTH HAULER For Young Engineers

By William P. Kupka

**P**INT-SIZED construction engineers who are planning extensive operations next summer in a back-yard sandbox will be delighted to receive this jumbo-sized earth hauler to add to their equipment.

The bases of both the tractor and the trailer are cut and shaped from  $\frac{3}{4}$ -in. stock to the dimensions given in the detail on page 183. Next, four axle hangers are cut from  $\frac{3}{4}$  x  $1\frac{1}{2}$ -in. stock. These are drilled to receive  $\frac{3}{4}$ -in. dowel axles and nailed to the bases. The axles for the trailer are centered in the hangers, while the tractor axles are placed 1 in. back from center. The hoist base is  $1\frac{1}{4}$  x  $2\frac{1}{4}$  x 6 in. with a bevel cut on one end so the top measures  $5\frac{1}{2}$  in. A piece of  $\frac{1}{16}$ -in. sheet metal is fitted to the top of the hoist base and a 12-in. length of flat iron is fitted to the underside of the trailer base to form the drawbar. Holes are drilled in line through the hoist base, trailer base and drawbar to receive  $\frac{1}{4}$  x 3-in. bolts and the assembly is bolted together. The end of the drawbar is bent downward to provide a loose fit for the tractor hitch.

The U-shaped hoist is bent from 1-in. flat iron and is 10 in. high and 1 in. wide at the top. The braces between which the crank and drum fit are 6 in. long. A 60d spike is bent cold to form the crank and inserted through two  $\frac{3}{16}$ -in. holes drilled 3 in. from the lower ends of the braces. Then two  $1\frac{3}{4}$ -in. washers or sheet-metal



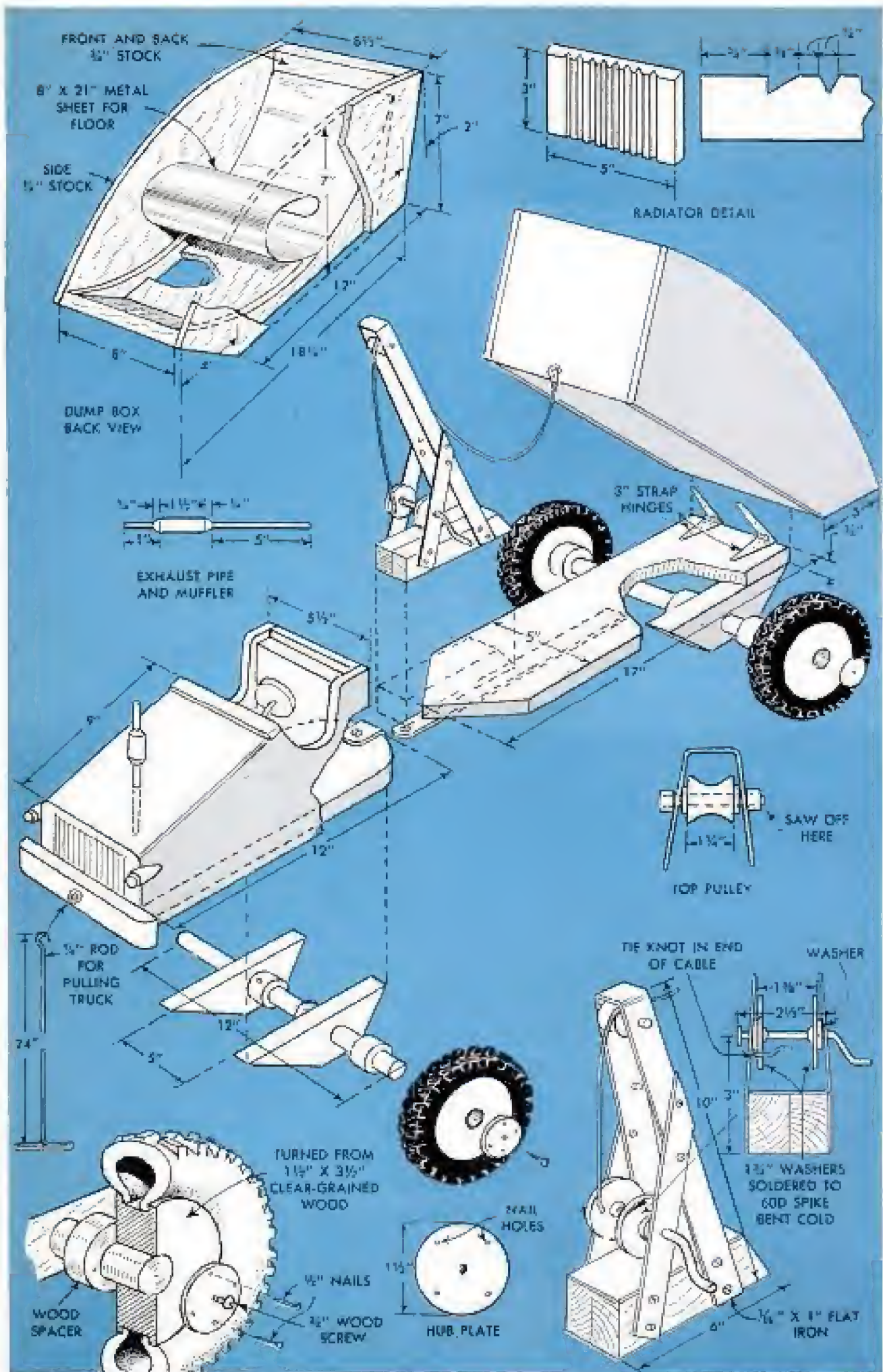
disks are soldered to the spike to form the drum, and two smaller washers are fitted on the crank between the drum and the hoist braces when the hoist is assembled.

The front, bottom and back of the hopper are of  $\frac{3}{4}$ -in. stock cut to the dimensions given in the detail. The sides, which are  $\frac{1}{4}$ -in. plywood, are fitted with curved overlays on the inner surfaces to support a sheet-metal floor. After the hopper is assembled, the sheet metal is nailed to the edges of the overlays. The hopper is attached with two 3-in. strap hinges.

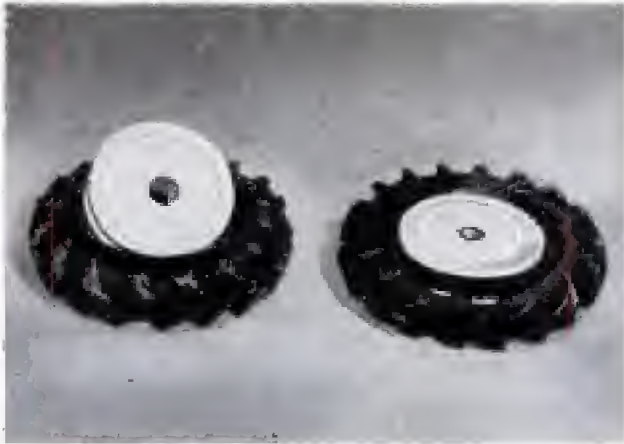
To form the hoist cable, a 14-in. length of picture wire is tied to a screw eye driven into the hopper front. The wire is passed over the top pulley and down to the drum, the end of the wire being pushed through a hole drilled in one of the drum flanges.

Painted a bright yellow to contrast with the black tires, the earth hauler presents a realistic appearance

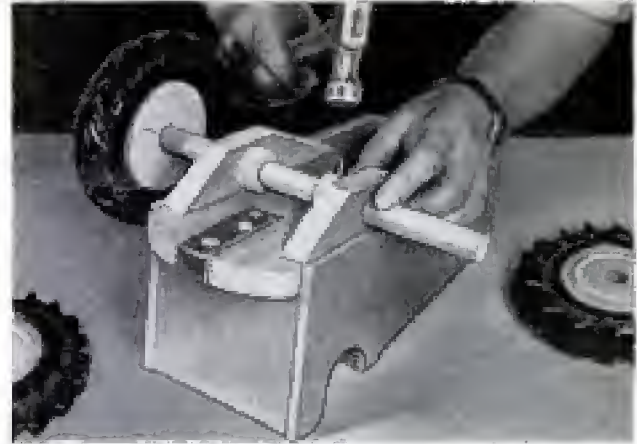








Tires taken from ash trays are fitted on turned wheels



Axles are fitted with collars and revolve in hangers

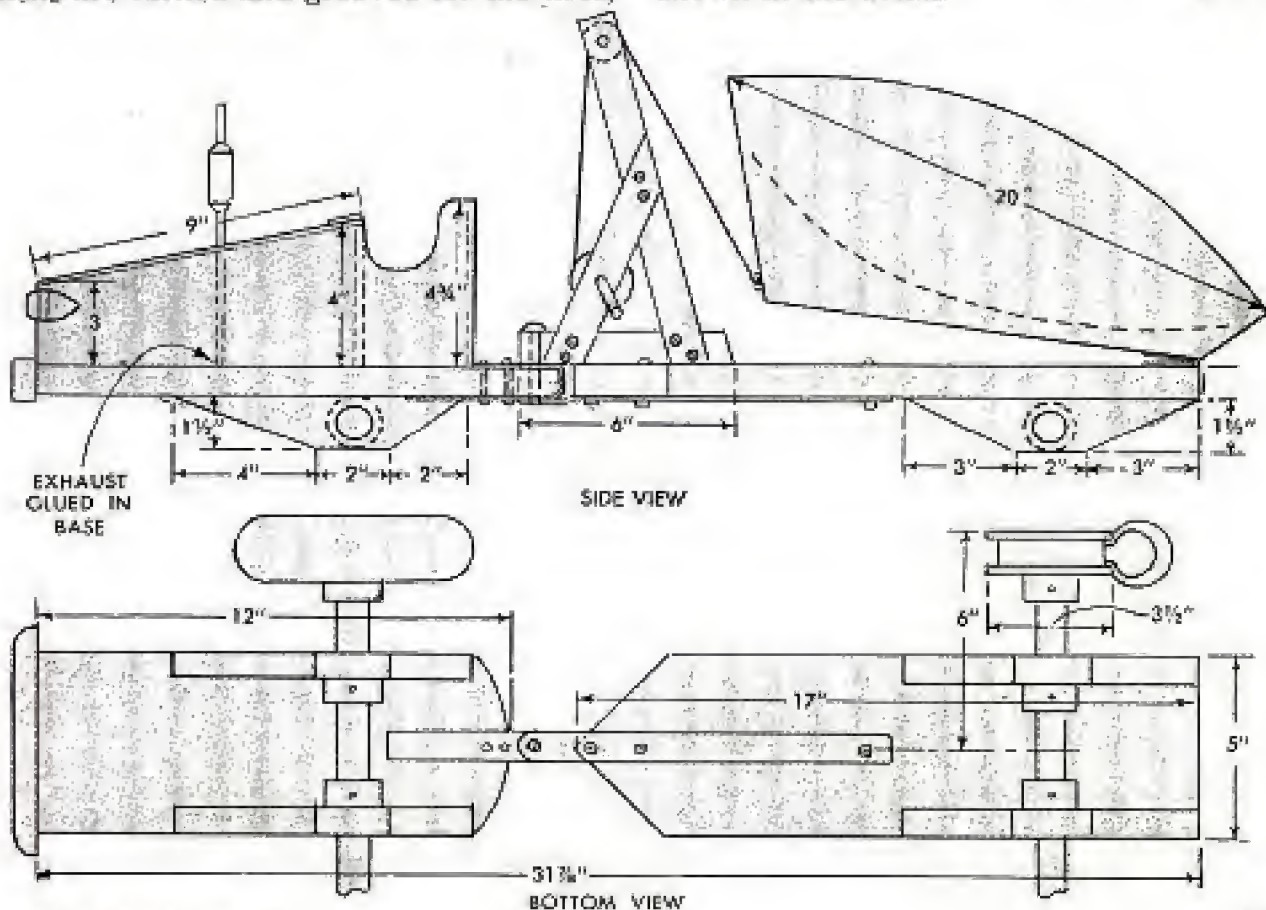
The tractor assembly starts with the radiator grille which is carved from a piece of  $\frac{3}{4}$ -in. stock, as shown in the upper right-hand detail on page 182. The edge view gives the dimensions of the grooves. The dashboard is 4 x 5 in. and the seat back is  $4\frac{3}{4}$  x 5 in. The three pieces are nailed to the tractor base, being located by using the side of the tractor as a template. The tractor sides and the top of the engine hood are  $\frac{1}{4}$ -in. stock. The flat-iron tractor hitch extends from the seat back around the rear edge of the tractor base and about 4 in. on the underside of the base.

The axles are fitted with spacing collars which fit inside the two hangers. The spacers between the wheels and hangers are  $1\frac{1}{4}$ -in. disks,  $\frac{5}{8}$  in. thick and are drilled to receive the axles. The wooden wheel disks are turned and grooved for the tires.

the grooves being  $\frac{3}{8}$  in. wide by  $\frac{1}{4}$  in. deep. The wheels are designed for tires taken from novelty ash trays. Four disks,  $1\frac{1}{2}$  in. in dia., are cut from 26-ga. sheet metal to provide hub caps. Drill a screw hole in the exact center of each disk and nail the disks over the centers of the wheels. Mount the wheels by driving a screw through the holes in the hub caps into the axles.

Fit the exhaust pipe and muffler into a hole drilled through the hood and  $\frac{3}{8}$  in. deep into the base. Locate the hole 5 in. from the front and  $1\frac{1}{2}$  in. from the left-hand side of the hood. The steering wheel is a 2-in.-dia. disk mounted on a 2-in. length of  $\frac{1}{4}$ -in. dowel. The headlights are shaped from 1-in. dowel,  $1\frac{1}{4}$  in. long.

A handle for pulling the toy can be made by bending a length of  $\frac{1}{4}$ -in. steel rod as shown in the detail. ★ ★ ★



## Open-End Rack on Wall Stud Holds Long-Handled Tools



Shovels, rakes and other tools that present a storage problem because of their length can be quickly removed from a rack made by nailing a short length of lumber to a wall stud in the garage or tool shed. The openings between the ends of the board and the adjacent wall studs permit the tools to be removed without lifting them. Also, no floor space is required as would be the case if the tools were stacked against the wall or stored on a horizontal rack.

## Oversize Ring Fitted to Finger With Adhesive Tape



FLESH-TINTED  
ADHESIVE TAPE

An oversize ring can be fitted to your finger temporarily by using a piece of adhesive tape. Use flesh-colored tape, cut to about half its width, and wrap it around the ring where it will be visible from the palm side only. Two or three turns of the tape usually are enough to make the ring fit snugly.

## Glue Container Cleaned Easily

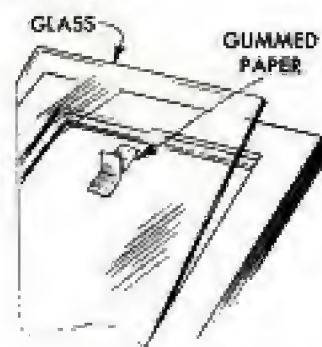
If you frequently use small quantities of glue, abrasives or patching plaster, make a container by cutting a hollow, rubber ball in half. Being flexible, such a container

can be cleaned easily by flexing the sides to loosen the dried material. Also, during use, all of the material is easily scraped out, thus cutting down on waste.

Jerome Toomey, Long Beach, Calif.

## Gummed-Paper Tab Lifts Glass For Trial Fitting in Sash

To make it easier to lift the pane out of the sash during trial fittings, fold a strip of heavy gummed paper as shown in the illustration and attach it to the glass. In addition to simplifying the lifting of the glass, the tab also reduces the chance of breaking or chipping the glass, which might happen if a screwdriver or a knife was used to pry up the pane.



## Treated Cellulose Sponge Hastens Negative Drying

Photo negatives can be dried more quickly after washing if they are wiped with a cellulose sponge that has been treated with a liquid wetting agent. Squeeze part of the water from a moistened sponge, add 3 or 4 drops of the wetting agent and work it into the sponge. Pass the treated sponge lightly over the wet negative. It will absorb most of the water, leaving a clean, shining surface with no pressure marks. The negative will be completely dry in less than an hour.—Ken Murray, Colon, Mich.



❑Candlewick bedspreads will not be “de-tufted” during laundering if they are placed in a large, cotton laundry bag before being put into the washing machine.

# Thermometers Check Humidity in Your Home

**HUMIDITY TABLE**  
RELATIVE HUMIDITY READINGS ARE PERCENTAGES

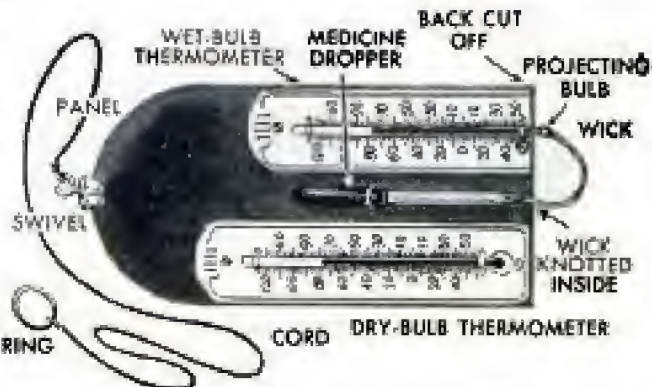
Difference in degrees between wet and dry-bulb thermometer:

Dry-bulb (Fahrenheit)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	
50° F.	93	87	83	74	68	63	56	50	44	39	33	28	22	17	12	7	2					
51	94	87	81	73	67	62	55	49	43	38	32	27	21	16	11	6	1					
52	94	88	81	73	67	62	55	49	43	38	32	27	21	16	11	6	1					
53	94	88	82	75	70	64	58	52	47	42	37	32	27	22	17	12	7	2				
54	94	88	82	76	70	65	59	54	48	43	38	33	28	23	18	14	9	4	0			
55	94	88	83	76	71	65	60	55	49	44	39	34	29	25	20	15	11	6	2			
56	94	88	82	77	71	66	61	55	50	45	40	35	31	26	21	17	12	8	4			
57	94	88	83	77	72	66	61	56	51	46	41	36	32	27	23	18	14	10	5	1		
58	94	89	83	77	72	67	62	57	52	47	42	38	33	28	24	20	15	11	7	3		
59	94	89	83	78	73	68	63	58	53	48	43	39	34	30	25	21	17	13	9	5	1	
60	94	89	84	78	73	68	63	58	53	49	44	40	35	31	27	23	18	14	10	6	2	
61	94	89	84	79	74	69	64	59	54	50	45	40	36	32	28	24	20	16	12	8	4	
62	94	89	84	79	74	69	64	60	55	50	46	41	37	33	29	25	21	17	13	9	6	
63	95	90	84	79	74	70	65	60	56	51	47	42	38	34	30	26	22	18	14	11	7	
64	95	90	85	79	75	70	66	61	56	52	48	43	39	35	31	27	23	20	16	12	9	
65	95	90	85	80	75	70	66	62	57	53	48	44	40	36	32	28	25	21	17	13	10	
66	95	90	85	80	76	71	66	62	58	53	49	45	41	37	33	29	26	22	18	13	11	
67	95	90	85	80	76	71	67	63	58	54	50	46	42	38	34	30	27	23	20	16	13	
68	95	90	85	81	76	72	67	63	59	55	51	47	43	39	35	31	28	24	21	17	14	
69	95	90	85	81	77	72	68	64	59	55	51	47	44	40	36	32	29	25	22	19	15	
70	95	90	86	81	77	72	68	64	60	56	52	48	44	40	37	33	30	26	23	20	17	
71	95	90	86	82	77	73	69	64	60	56	52	48	45	41	38	34	31	27	24	21	18	
72	95	91	86	82	78	73	69	65	61	57	53	49	45	42	39	35	32	28	25	22	19	
73	95	91	86	82	78	73	69	65	61	58	54	50	46	43	40	36	33	29	26	23	20	
74	95	91	86	83	78	74	70	66	62	58	54	51	47	44	40	37	34	30	27	24	21	
75	95	91	87	83	78	74	70	66	63	59	55	51	48	44	41	38	34	31	28	25	22	



Have you ever wondered what the humidity was in your home, so you could increase or lower the capacity of the humidifier in your heating plant to assure the health and comfort of your family? A simple psychrometer—an instrument for determining humidity—can be made by utilizing two ordinary thermometers. The thermometers should be fairly accurate and agree within a degree or two. Mount both thermometers on a panel of hardboard or plywood, as shown. Cut off the back plate of one thermometer so the bulb projects beyond the panel. The latter will be the "wet bulb" thermometer, with a cotton wick fitted over the bulb. A cotton shoe-string will do. Thread the other end of the wick through the small end of a medicine dropper and knot the wick so it cannot slip out. Drive a screw eye into the panel between the thermometers to hold the rubber bulb of the dropper. Then, to fill the dropper, simply slip the glass portion out of the rubber bulb and submerge it in water. Attach a strong cord or chain, fitted with a swivel, to the top of the panel.

To use the psychrometer, fill the dropper with water and saturate the wick throughout its length. Then whirl the panel in the air for about 10 to 15 seconds and quickly note the readings of the thermometers. Check the wet-bulb first, as it rapidly changes. Next, note the dry-bulb reading. Now subtract the wet-bulb reading from the dry-bulb reading. Refer to the table above, looking down the scale along the left-hand side to locate the dry-bulb reading. Then go across on this line to the column which corresponds to the difference between the two readings.



For example, if the dry-bulb reading was 70 deg., and the wet-bulb reading was 55 deg., the difference between the two would be 15 deg. Looking down the left-hand column of the humidity table, we find the dry-bulb reading of 70 deg. Then we go across on this line to the column headed "15," which is the difference between the two readings. The figure given in this column shows that the relative humidity is 37 percent.

## Covers on Jaws of Pipe Wrench Permit Use on Chrome Fixtures

In an emergency, a pipe wrench often can be used to turn a chrome-plated nut or fixture by covering the teeth of the jaws with a soft-metal cover. Aluminum, brass or copper may be used, as it will not mar the chrome if used carefully. The covers can be shaped so that they snap over the pipe-wrench jaws and stay in place by tension.

Ⓜ A nail dipped into colorless nail polish before it is driven will "stay put" longer. And screws that work loose can be replaced permanently if the polish is brushed into the hole before resetting the screw.

SN 56

# fine finishes

# for fir

## and other SOFTWOODS



Monsanto Chemical Company photo

By Sam Brown

**FIR PLYWOOD** can be finished so it is satin-smooth to the touch and handsome in appearance if the correct finishing materials are used properly. Most important of these materials is a phenolic-resin primer-sealer, a penetrating type of finish that dries in the wood and equalizes the density of the hard and soft grains. Paint-

ing or staining wood treated in this manner results in an even tone without the dark and light streaks which usually result on untreated wood.

**Natural fir:** A natural finish on any wood means that it is finished with only a clear top coat and is not stained or colored in any way. To apply the natural finish, first sand the wood smooth, finishing with a 3/0 garnet sandpaper. Apply clear phenolic-resin primer-sealer with a brush, mop or cloth. Let it dry for 5 min. or until some areas start to dry and show "flat." Then, with a soft cloth, rub the wet areas into the dry area and finally rub the whole job with long strokes, parallel to the grain. The finish will be dry enough to permit moderate handling, but must be dried for at least 8 hr. before it can be sanded. When it is thoroughly dry, sand lightly with 6/0 garnet. Brush or wipe off the sanding dust and apply any conventional clear topcoat such as shellac, varnish or lacquer. Because the wood has been well sealed with the phenolic-resin solution, only one coat of the top dressing is required, especially if the finish is to be protected with a coat of furniture wax.

**Enamel finish:** Paints and enamels can be used to provide an excellent finish on fir if the wood is given a suitable undercoat

### MATERIALS

**PRIMER-SEALER:** As applied to plywood, primer-sealer is a phenolic resin in solution with tung oil and mineral spirits. Sold as a trade-name product (Rez, Firzite, etc., and also as Plywood Sealer, Floor Sealer, etc.) Many of the so-called "penetrating wood finishes" are the same material. Light amber in color; very fluid, is almost the consistency of water.

**COLORED SEALER:** Primer-sealer as above, with pigment coloring added. Sold in several shades of red, green and gray.

**WHITE SEALER:** Primer-sealer with white pigment added.

**COLORS-IN-OIL:** Available at all paint stores in tubes, cans. May be added to clear primer-sealer to produce desired color.

**SANDPAPER:** 3/0 garnet for bare wood. 6/0 to sand all finish coats; alternate use of 2/0 steel wool is practical.

**CLOTH WIPER:** Cheesecloth or other soft, clean cloth.



Douglas Fir Plywood Association photos

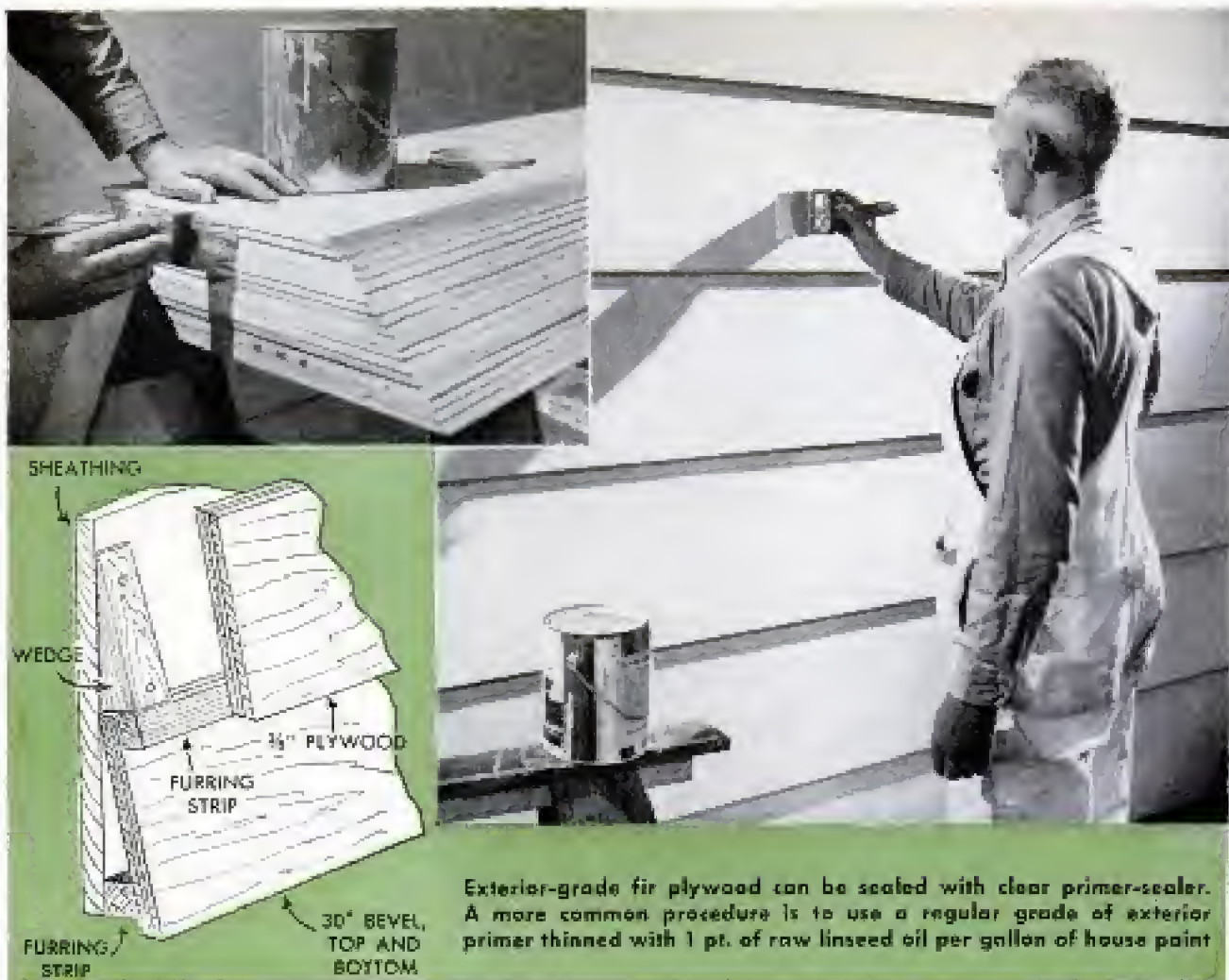
Above, phenolic-resin primer sealer is first coat on bare plywood. Right, center, when primer-sealer is completely dry, it is sanded with 6/0 garnet. Bottom photo, finish coat is applied after sanding

of either clear or white phenolic-resin primer-sealer. One coat of enamel over the primer-sealer often is enough to provide a satisfactory finish. The top photo on this page shows clear primer-sealer being applied. Notice that the bottom of the table is being sealed, as well as the surfaces that will show. When dry, the primer-sealer is sanded or steel-wooled, center photo. The bottom photo shows the finish coat of enamel being applied.

**Blonde toning:** A lighter-than-natural finish can be given to fir plywood by applying a coat of white primer-sealer, which is wiped off after drying for about 5 min. After it has dried for 8 hr. it is sanded with 6/0 garnet paper. Apply a coat of clear varnish. When the varnish is dry, rub it down with 4/0 steel wool and apply a coat of paste furniture wax. Although the over-all tone of the wood will be quite light, the grain pattern will be distinct.

If a blonde tone with less grain pattern is desired, first apply a coat of clear primer-sealer and let it dry thoroughly. Next, apply the white primer-sealer and wipe it off. Allow the wiped coat 8 hr. to dry, then cover it with clear varnish, as with the other blanding method.





Exterior-grade fir plywood can be sealed with clear primer-sealer. A more common procedure is to use a regular grade of exterior primer thinned with 1 pt. of raw linseed oil per gallon of house paint

If you wish to use the blonde finish on a piece of furniture or other fir-plywood surface, experiment on scraps of plywood to determine which of the two finishes you will like the most.

**Color tones:** A wide variety of color tones can be applied to fir plywood and other soft woods. Phenolic primer-sealer is available in many colors, as well as clear or white. Also, you can add colors-in-oil or oil stain to either clear or white primer-sealer. If the tube oil colors are used, mix the color pigment separately with a little turpentine or mineral spirits until the solution is fluid enough to combine readily with the primer-sealer. Deeper colors will, of course, require a greater proportion of color pigment; lighter shades or tints will require less. Also to be remembered is the fact that most pigments have a greater intensity when dry than when wet. Allow a sample of the colored stain or sealer to dry thoroughly before judging the color.

Uniform color tones with a subdued-grain effect are usually obtained by using two coats of the desired color. The first coat is wiped off while still wet. The second coat then is applied over the dried first coat and blended with a brush or soft cloth. This color-toning method will produce a flat fin-

ish which must be covered with a coat of varnish, shellac or lacquer to produce a surface gloss.

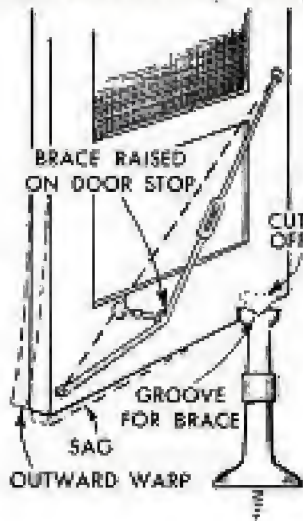
**Exterior fir:** Clear or white primer-sealer makes an excellent first coat for exterior plywood. Alternately, the common method of using a good exterior primer thinned with raw linseed oil can be used. It is most important to seal all edges on exterior plywood, and this operation often is done more easily before assembly as shown in the inset photo above.

The detail below the photo shows a method used to apply plywood strips to form a "bevel siding" effect. For best results, the furring strips and wedges should be painted before they are covered.

Outdoor furniture made of fir plywood should be given a first coat of primer-sealer to assure protection for the wood.

**Other woods:** Primer-sealer is effective on all woods. It is used on pine, redwood and cypress in exactly the same manner as on fir. It is not as satisfactory on open-grain hardwoods, although it is effective as a pigment stain over a paste filler. When used as a color toner on close-grained hardwoods, it is applied to the bare wood. More than one coat is used when a deeper tone is desired. ★ ★ ★

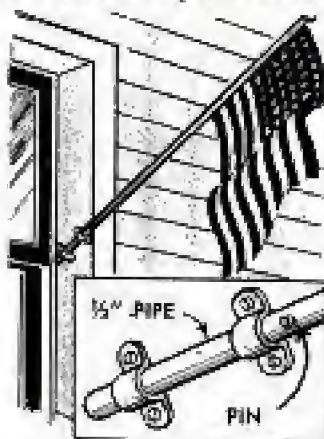
## Warped and Sagged Storm Door Corrected by Single Brace



When a combination storm door develops an outward warp and sag near the bottom of the opening edge, a single turnbuckle brace and metal doorstop will correct both troubles. The turnbuckle brace goes on the inside of the door, diagonally upward from the lower corner of the opening edge. The

doorstop is modified by cutting off the portion that holds the rubber bumper, and filing a groove in the stop to receive the brace. The stop then is placed at the center of the warp and the brace is tightened.

## Improved Holder for Flag Utilizes Pipe Clamps

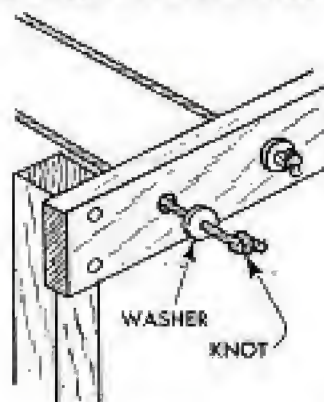


Wishing to fly the flag for a holiday, but not having a regular flag-staff holder, one homeowner improvised one by using two  $\frac{1}{2}$ -in. pipe clamps. The clamps are screwed to a window frame, porch column or other convenient location. A nail, slipped

into a hole drilled in the flagstaff, provides a bearing pin which rests against the top clamp and holds the staff in place.

Paul Smith, Portland, Oregon.

## Washer Under Clothesline Knot Holds in Oversize Hole



If a bored hole in a clothesline support is oversized and lets the knotted end of the line pull through, a steel washer solves the problem. Use a washer that will slip over the rope, but not through the hole.



## Envelopes Are Sealed Faster With Felt Dauber

When sealing a large number of envelopes, such as wedding invitations or Christmas cards, you can use the felt dauber from an empty shoe-polish bottle to speed the work. Wash the bottle and dauber and put in a small amount of water. A quick sponge with the wet dauber across each envelope flap will moisten it for sealing.—Blanche Campbell, Las Vegas, Nev.

## Heating Element of Soldering Iron Can Be Repaired Temporarily

When the heating element of an electric soldering iron has parted, it can be repaired temporarily to provide several hours' service. First, carefully disassemble the iron and examine the wire for the break. Then gently twist the broken ends together with tweezers or pointed-nose pliers. A new element should, of course, be installed as soon as it is practicable.



# RUBBER-STAMP

WTM 56

# Christmas Cards

By Theodosia Carpenter



Above, melted beeswax is poured on glass of picture frame to a thickness of  $\frac{1}{8}$  in. Use only beeswax.



Above, a series of snowflake designs is cut in wax with stylus. Each flake can be printed in different color on Christmas card if mounted on individual blocks. Below, liquid rubber is poured over design.



**M**AKING YOUR OWN Christmas cards is fun, it's easy and it's inexpensive when you cast your own printing blocks in rubber. With this novel method you can produce personalized cards that really say "Merry Christmas" to your friends. The materials needed to make these printing blocks are an inexpensive "dime store" picture frame, beeswax (obtainable at most drug or hardware stores) and a supply of liquid rubber which can be bought at hobby shops and art-supply stores.

The beeswax is melted and poured over the glass of the picture frame to a depth of about  $\frac{1}{8}$  in. Be sure that the glass is tight in the frame so that the hot wax will not run out. And note, too, that only beeswax can be used. Paraffin and other common waxes are too brittle. If the beeswax is uneven or too thick, the excess is scraped off to make a level surface.

Next, the design you have selected is traced lightly on the surface of the wax, using carbon paper. You can make original





sketches or use designs obtainable from a number of sources. The two patterns at the bottom of page 190 are typical card designs you can use. Now the lines of the design are cut into the wax with a regular stylus or with a very hard pencil sharpened to a moderately fine point. Each line of the design must be cut clear through to the glass, and the stylus should be held vertical as the cuts are made. The progress of the work can be checked by holding the frame to the light. Only those portions of the design where the glass is completely free of wax will print in the final design.

When this beeswax mold is completed, a very thin layer of liquid rubber, sometimes called latex molding compound, is poured over the design. The thinner this first layer is, the better the results will be. After pouring, hold the frame up so the underside of the mold is visible and, with the fingers, work the liquid rubber into any portions of the design which may not have been completely filled. Remove any bubbles, then allow the rubber to set 12 to 24 hours.

Pour another layer of liquid rubber, somewhat thicker than the first, over the hardened layer and allow this to set also. Now the rubber casting can be pulled away from the beeswax mold. Clean any wax from the completed plate. Then, using rubber cement, mount the printing plate on a smooth block of wood.

Use water-soluble linoleum-block ink to print with your cast-rubber printing block. The ink comes in a tube. A small amount is squeezed onto a sheet of glass, and a roller is moved back and forth on it until the ink is evenly distributed. Then it is rolled across the printing block. With the paper resting on a hard, smooth surface, the block is pressed down on it, in the same way that a standard rubber stamp is used. If, in printing the first picture, you find that the rubber plate is taking up ink and making smudges between the lines of the design, remove the plate from the mounting board and cut out the excess rubber between the lines.

When two or more colors are desired, make the whole design in one casting. Then cut out the portions of the design to be printed in each color and mount these on separate blocks. In this case, the blocks should be of exactly the same size. A T-square or the corner of a box should be used to help align each block. ★ ★ ★

DECEMBER 1954



After the liquid rubber has set, above, it is pulled away from the beeswax mold. All wax is cleaned from the plate

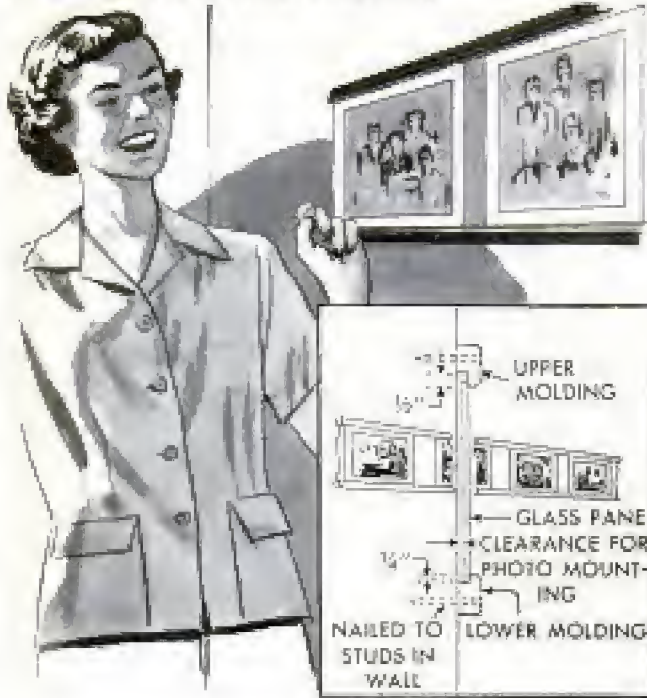


Above, using rubber cement, the finished printing plate is mounted on a wooden block. Below, after inking with linoleum-block ink, the printing block is used like a regular rubber stamp to reproduce the original design



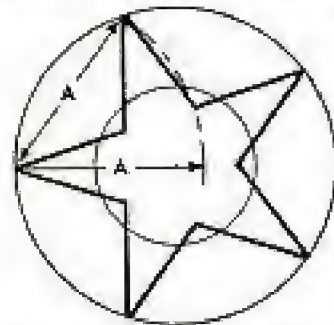
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## Rabbeted Molding Nailed to Wall Provides Picture Display



A simple mounting for displaying a number of photographs or paintings can be made by nailing two strips of rabbeted molding to the wall with finishing nails. The molding should be spaced to accept the largest picture that will be displayed; smaller pictures can be framed in matboard cut to fit. The rabbet in the molding should be wide enough to accept a pane of glass as well as the pictures.

## Easy Way to Draw Stars



Although drawing a five-pointed star might seem difficult, it actually is quite easy. First, scribe a circle having a diameter equal to that of the desired star. Next, using the same center, inscribe a circle having a diameter one half that of the first one. Then set the compass points to a distance equal to the radius of the large circle plus  $\frac{1}{3}$  the radius of the

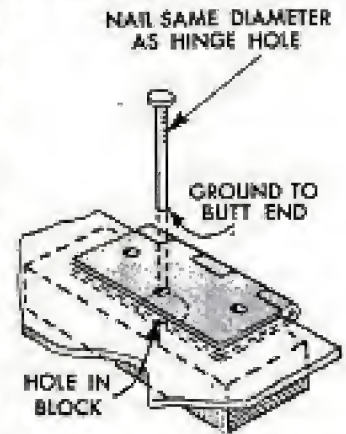
## Weave Your Own Cloth...

Handweaving once was a necessary skill in every American household. Now it's back again, this time as a creative and practical hobby that permits you to make your own material for suits, skirts, tapcoats, etc., in your home at a surprisingly low cost. Read the story about the loom that makes this possible in next month's issue

small circle, line A in the detail. Walk the compass around the circumference of the large circle, marking each point of contact. Now join opposite points with straight lines to form a five-pointed star.

## Hinge and Nail Used as Punch To Make Holes in Leather

In the absence of a leather punch a butt hinge and a nail can be used as a substitute. The nail, which must be a snug fit in a screw hole of the hinge, is ground or filed square across to form a sharp edge. The material to be punched is placed between



the folded leaves of the hinge which then is located over a hole or slot in a block of wood. A hammer is used to drive the nail through.

## Sheet-Metal Guard on Ax Prevents Damage to Handle

There will be no more kidding about the "beavers chewing your ax handle," if a metal shield is nailed around the handle close to the head. This part of the handle is subject to nicks and splintering, and such a guard will eliminate frequent replacement of the handle. Use heavy sheet metal and drill it for the nails. A neater job can be done by using copper or brass rivets.

E. R. Haan, Evanston, Ill.



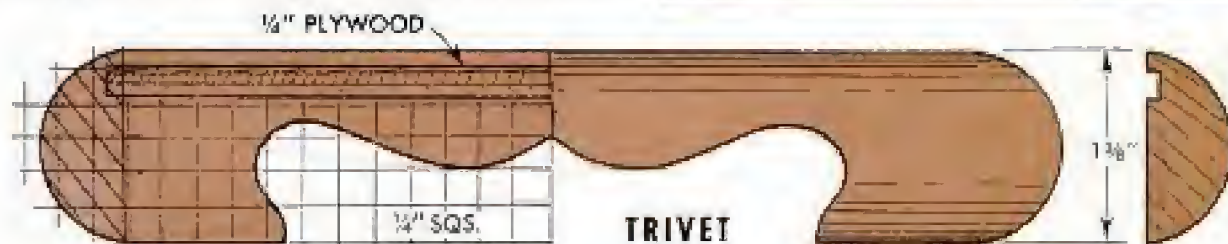
☛ A drop of water carefully placed on the top surface of a genuine diamond will remain in globule form, but will spread out if the stone is glass or paste.

# Six Projects USING TILE

By Bertram Brownold

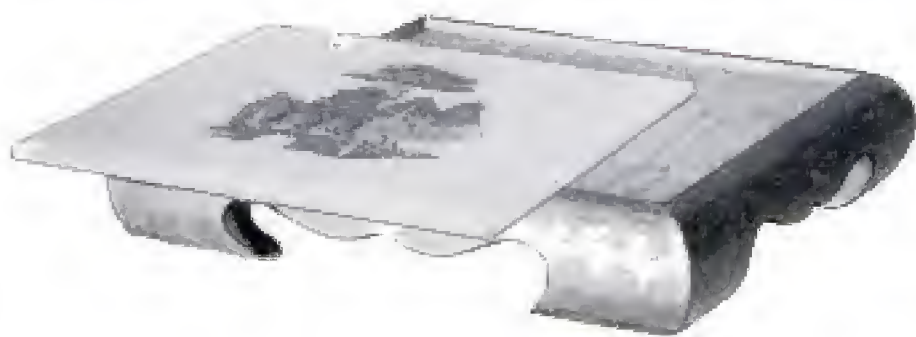
**C**OMBINING COLORFUL TILE with hardwood, plywood and metal offers the home craftsman a new field of interesting projects. Two kinds of tile can be used for these projects. The first is glazed ceramic tile, which may be purchased either plain or with painted pictures under the glaze. The latter, of course, is the more expensive variety. The plain glazed tile may be decorated by hand-painting or with easily applied decals which afford a wide selection of designs.

The other type of tile available is the colorful plastic group of the type ordinarily used for wall covering. These come in many solid colors and a variety of marbled finishes. They are available in several sizes, are easy to work and are especially suitable for those projects where the tile has to be cut. This tile, of course, is not satisfactory for use on projects where it is likely to be exposed to considerable heat. Neither is it recommended for tray or table tops where it is likely to be scratched or

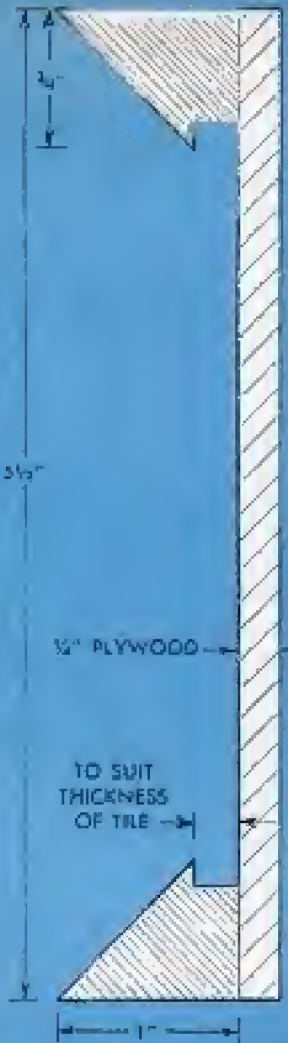


Trivet for hot dishes is made from half-round molding, plywood and a 6 x 6-in. ceramic tile. The trivet base consists of four pieces of molding, each piece being 7½ in. long after the corners have been mitered. Before the corners are mitered, however, the molding is grooved ¼ x ¼ in., a distance of ¼ in. from the top edge. This groove receives the edges of a 6¼-in.-sq. panel of ¼-in. plywood. After mitering, the molding is jigsawed according to the squared

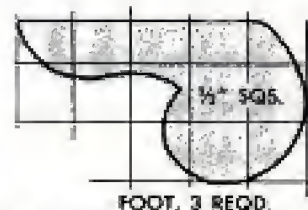
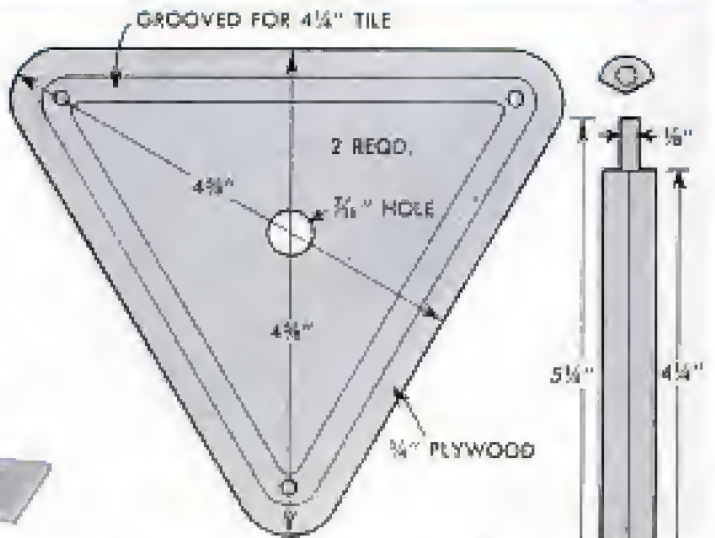
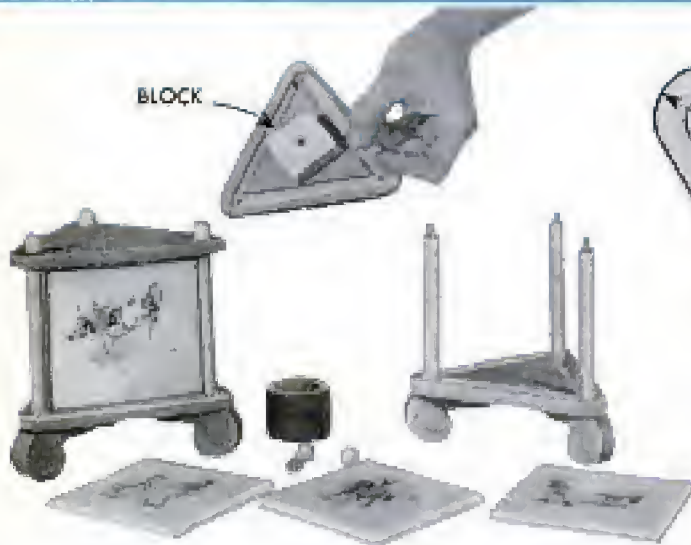
pattern above. As shown in the photo directly above the detail, the molding section may be held level for jigsawing by nailing a block to each mitered end, the block being beveled 45 deg. to match the miter. Blocks are nailed and glued in the corners of the trivet base as in the photo below. When the base has been finished, a ceramic tile is cemented over the plywood. A plastic tile should not be substituted in this case because it would be subjected to much heat



## SHADOW BOXES



Mounting ceramic tiles in shadow-box frames provides an interesting and unusual wall decoration. The frames are made from beveled molding and  $\frac{1}{2}$ -in. plywood as shown in the detail at the right. The molding is rabbeted to receive the edge of the tile and the four corners are mitered. Nailing the plywood backing to the four pieces of molding holds the joints tight. Paint the molding black or in a color that harmonizes with the tile pictures before assembling the frames. Then set the tile inside the frame and attach the plywood backing



## TABLE LAMP



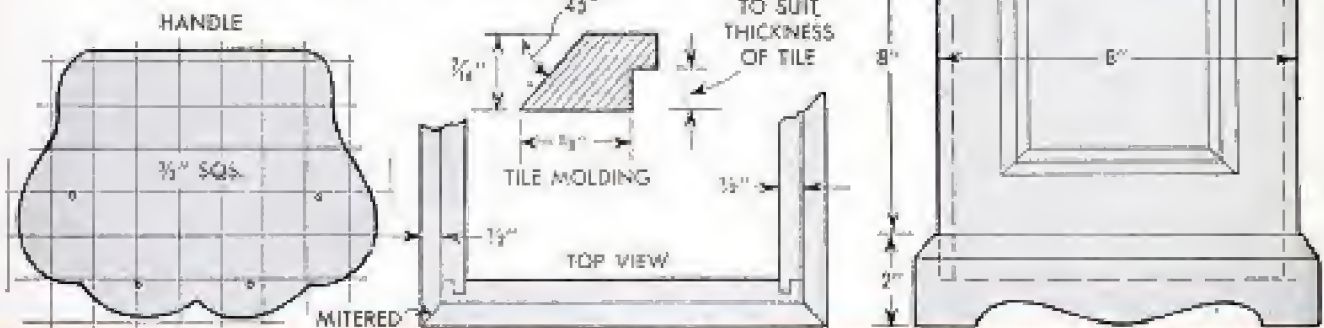
Table lamp for child's room features three ceramic tiles on a triangular-shaped lamp base. The base consists of two triangular pieces of  $\frac{1}{4}$ -in. plywood cut to the dimensions given in the detail. These are grooved to receive the tiles and drilled for tenons cut on the ends of three posts. The latter may be  $\frac{3}{8}$ -in. dowel or  $\frac{3}{8}$ -in.-sq. stock. Jigsawed feet are added and wooden knobs are fitted over the post tenons after assembly



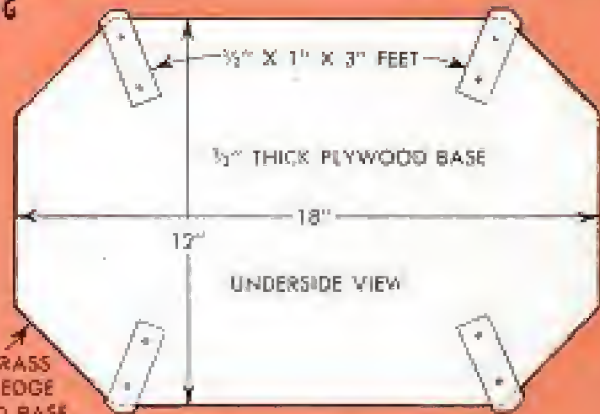
## PLANT BOX



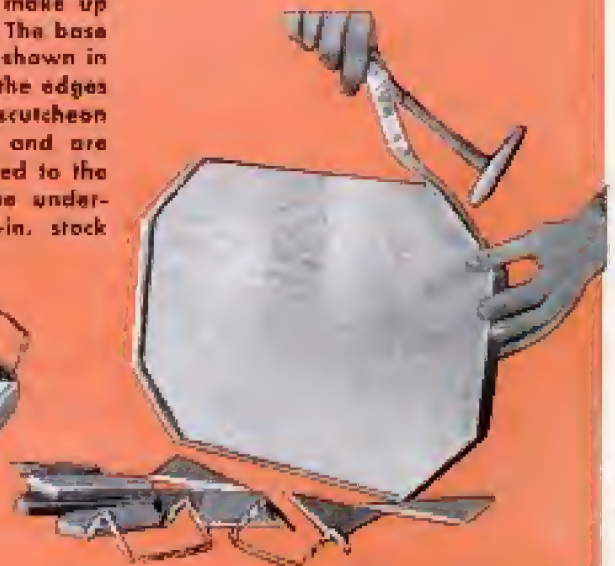
This attractive plant box is faced with a decorative ceramic tile set in a contrasting frame. The box, which will handle a fair-sized potted plant, is made of  $\frac{1}{2}$ -in. plywood or lumber. Note that tongue-and-groove joints are used in assembling the sides of the box and that the corners of the base are mitered. The bottom of the box may be glued and bradded between the side members or set in grooves cut horizontally near the lower edges of the sides. The molding for the tile frame is beveled and rabbeted to receive the edges of the tile. The frame is painted and the tile dropped in place before the top piece of molding is applied. The handles are of sheet brass, copper or aluminum and bent to form a finger grip

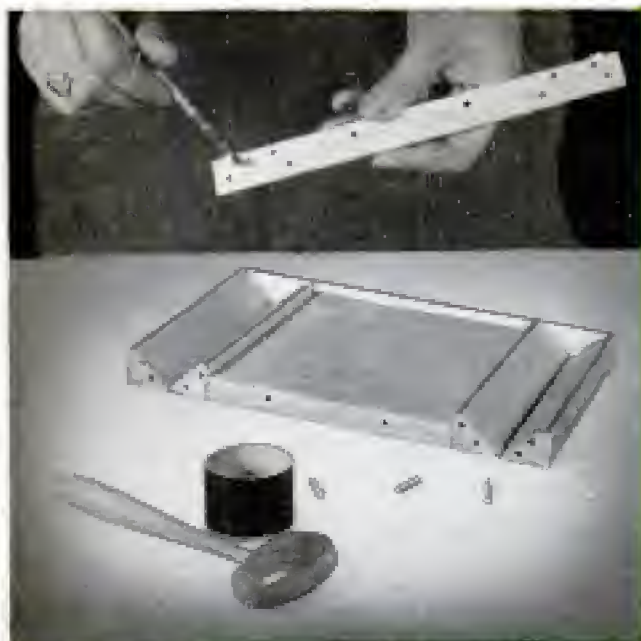


## SERVING TRAY

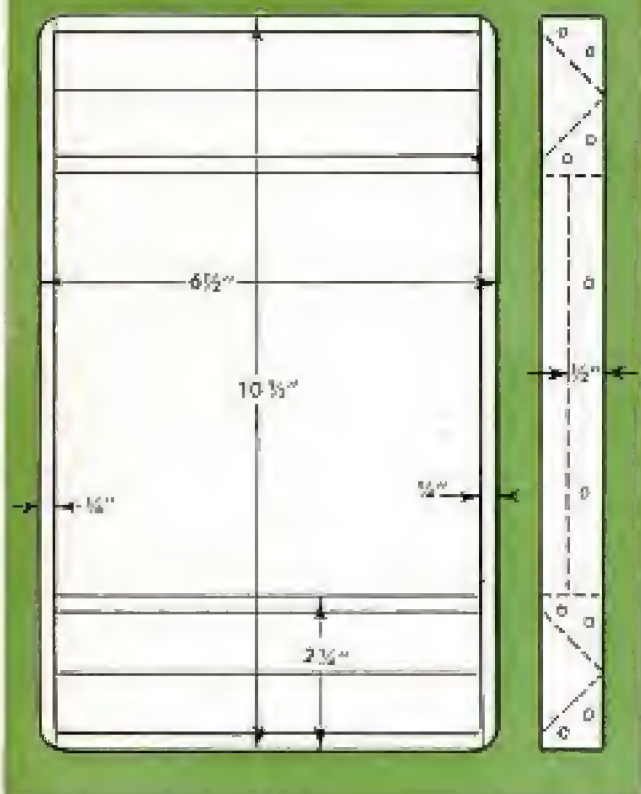


Six plastic or ceramic tiles and eight pieces of plywood make up the geometric design covering the top of this serving tray. The base of the tray is a 12 x 18-in. panel of  $\frac{1}{2}$ -in. plywood cut as shown in the detail. Nail a length of 1-in.-wide sheet brass around the sides of the tray, using brass escutcheon pins. The ends of the brass strip overlap about  $\frac{1}{2}$  in. and are riveted together. A pair of twisted-wire handles is anchored to the tray by means of pieces of sheet metal screwed to the underside of the plywood. The feet are 3-in. lengths of  $\frac{3}{8}$ -in. stock





The cheese-and-cracker server features novel dowel-peg construction. Five pieces of hardwood form two cracker troughs and base for tile tray

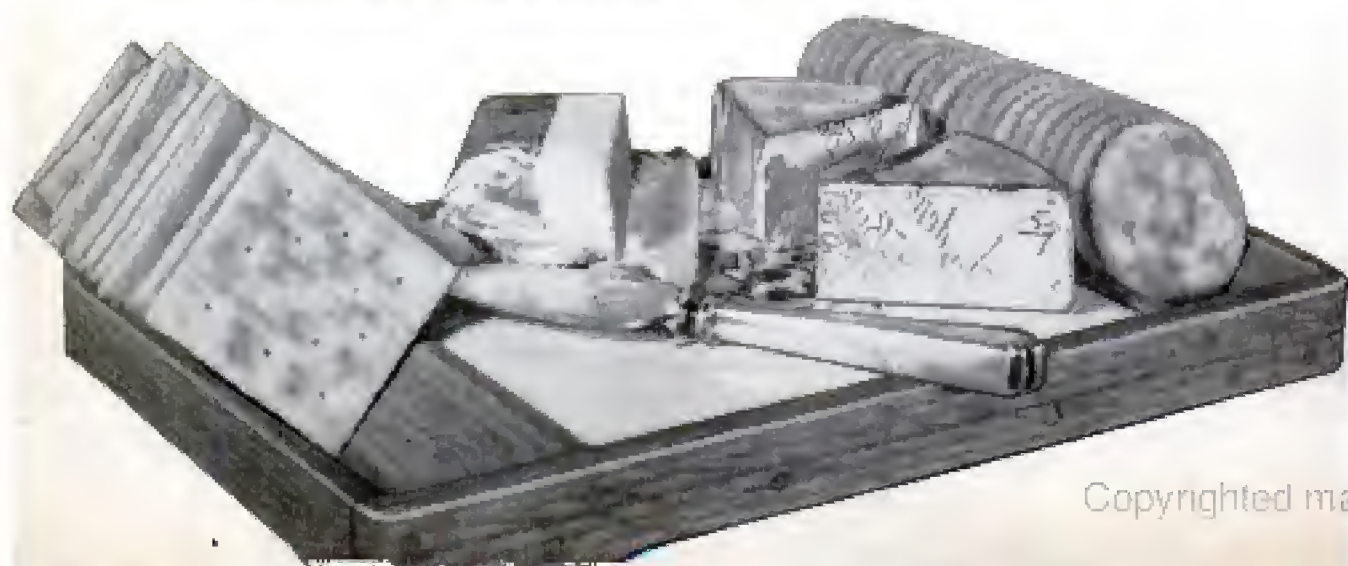


scored. In most other cases, however, the plastic tile can be substituted for the ceramic tile if you like. Decorative decals also may be applied to the plastic tiles, which are then given a coat of lacquer.

Neat workmanship and careful finishing are important to the appearance of the project and, of course, enhance the interest of the tile itself. As far as finishing is concerned, you probably will want to paint the wooden portions of the projects or use a wood stain followed by a clear finish. If hardwood or hardwood-faced plywood is used in the projects, it preferably is finished natural.

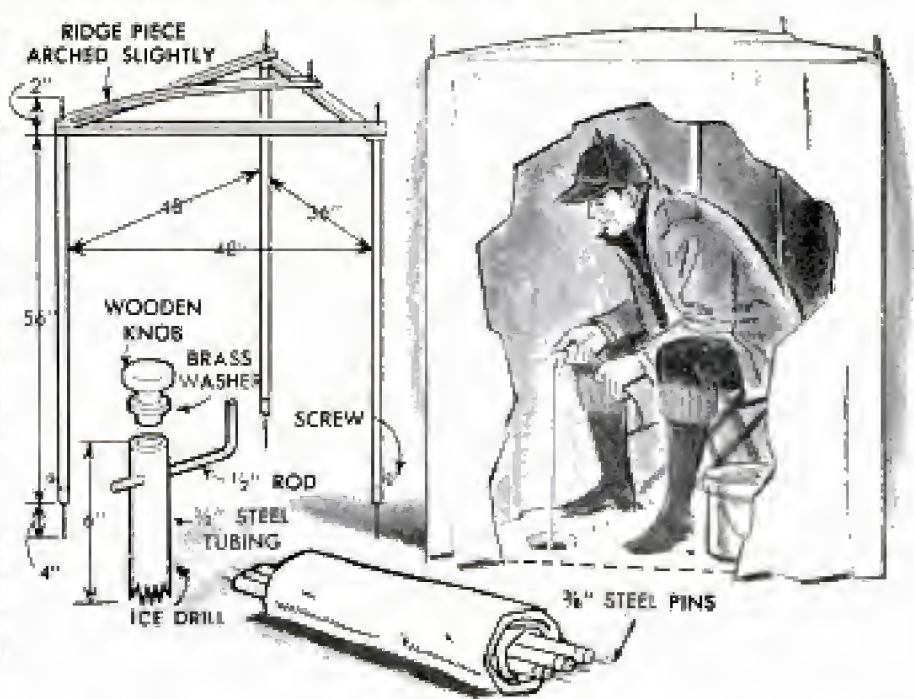
You will find that either a pigmented oil or nongrain-raising stain will do for this type of finishing. The pigmented oil stains are excellent for softwood as well as certain close-grained hardwoods, such as maple and birch. The nongrain-raising stain is best when finishing any of the open-grain woods. The stains may be coated with shellac, lacquer or varnish after they have dried thoroughly. This requires anywhere from 30 min. to a couple of hours depending on the stain used. Then the finish may be rubbed and polished to a final high gloss. ★ ★ ★

### CHEESE-AND-CRACKER SERVER



## Wedge-Shape Ice-Fishing Shelter Is Light and Portable

Overcoming the disadvantages of most ice-fishing huts, this neat little shelter may be rolled up to carry under your arm or stored in the trunk of your car, and its wedge shape offers little resistance when pointed into the wind. The uprights are 1-in. dowels, fitted with  $\frac{3}{8}$ -in. steel pins at both ends. The cross-pieces are drilled to fit over the pins and the canvas covering is fitted with grommets for the same purpose. Roundhead screws near the lower ends of the uprights project enough to catch in the grommets on the bottom edge of the canvas. A



drill to make holes in the ice for the steel pins at the lower ends of the dowels is nothing more than a 6-in. length of  $\frac{1}{2}$ -in. steel tubing with notches or teeth filed in

the lower end. The wooden knob, or handhold, turns on a brass washer as the drill is forced into the ice by the crank.

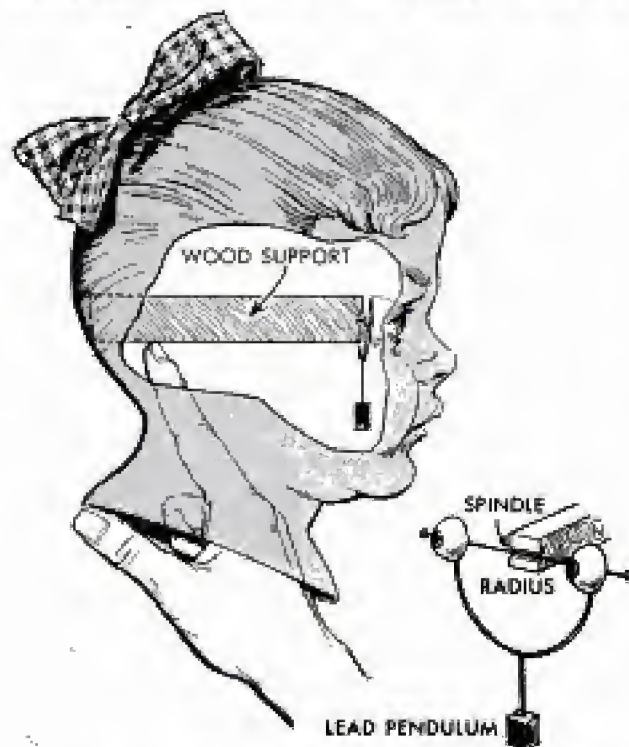
Hi Sibley, Nuevo, Calif.

## Doll's Lost "Eyesight" Restored With Wooden Support in Head

A simple wooden support often will restore the "sight" to a doll whose movable eyes have been poked back into its head. The reason for the eyes falling out is that one or both of the recesses molded inside the doll's head to receive the ends of the eye spindle have been broken. To restore the eyes, remove the doll's head from the

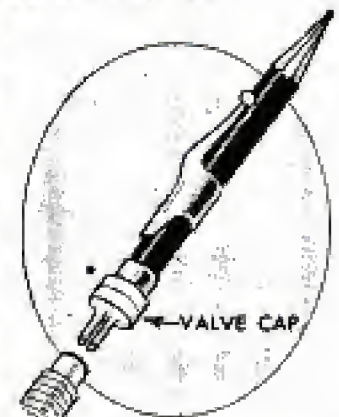
body, tip the head forward and replace the spindle in the broken recesses. Next, cut a wooden strip slightly longer than the distance from the back of the head to the spindle. File or grind a slight radius in the end of the support and lubricate it with a drop of oil. Gently force the support into the head against the spindle. Some adjustment may be necessary. If the support is too long it will bind and the eye spindle will not turn.

Basil Jackson, Toronto, Ontario, Can.

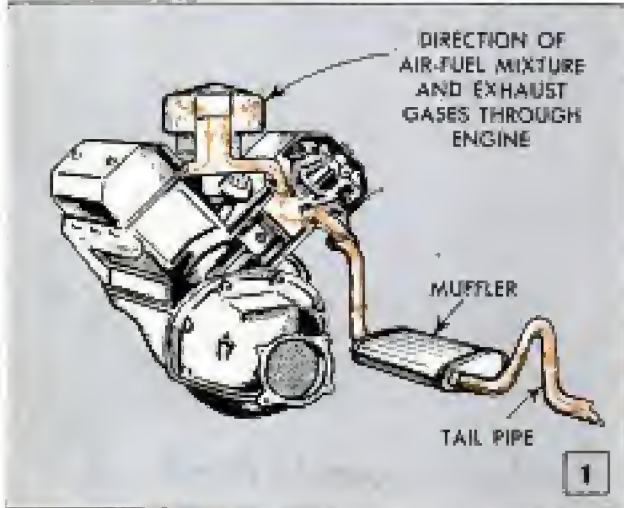


## Valve Cap Carried on Pencil

Screwed to the end of a round wooden pencil, a valve cap used to remove inner-tube valve cores will not be easily mislaid. A clip on the pencil will permit carrying it conveniently in the breast pocket of overalls. The cap is forced onto the end of a pencil which has no eraser, and the metal of the cap will cut threads in the soft wood of the pencil body.



G. E. Hendrickson, Argyle, Wis.

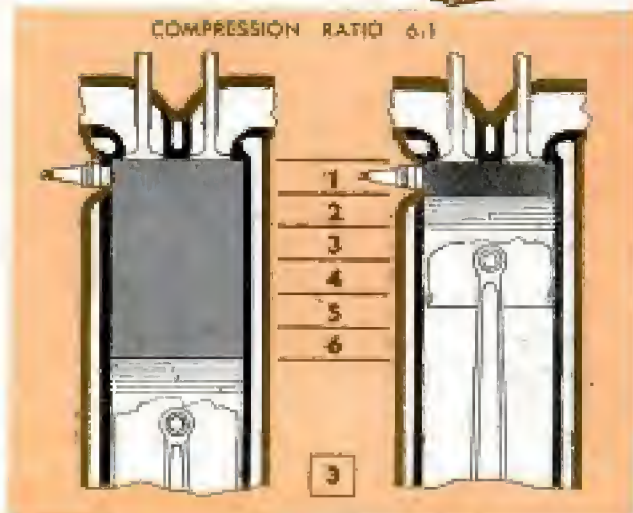
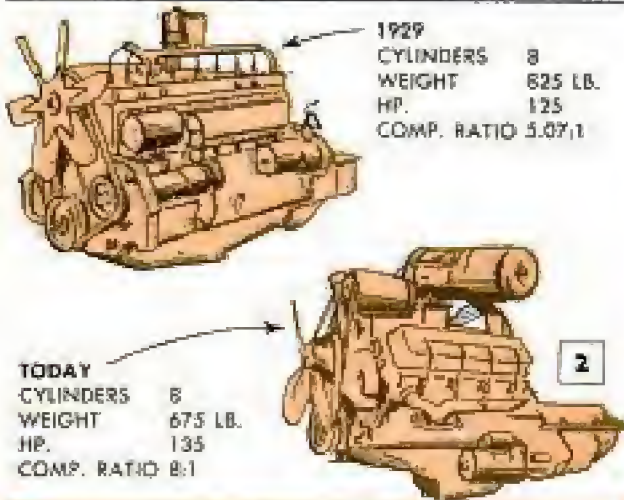


# New Cars Combine ECONOMY *with* PERFORMANCE

By Ed Packer

**T**HRILLING NEW SNAP and go have been given to your new car through hidden mechanical improvements of which you may not be aware. But you can't help but be aware of the nimble getaway and the impressive economy of fuel and lubricants throughout the average driving range. All functioning parts of the car—engine, ignition, transmission, overdrive and rear axle—have been re-engineered to produce these results.

For example, a tremendous amount of experimentation and design skill have been devoted to facilitating the passage of fuel mixtures and gases through the engine, and the result of all this effort is a marked increase in power and performance. Improvements have been made in air cleaners, carburetion, manifolding and muffler construction, as shown in Fig. 1. One of the improvements resulting in high performance with economy is the steady increase in engine power and a corresponding decrease in the weight of the unit. Note the comparisons in Fig. 2 and Fig. 3. Although the fundamentals of four-cycle engine operation have not changed appreciably, the constant increase in the compression ratio has stepped up the power output proportionally. Heat and pressure within the combustion chamber at the top of the cylinder have risen with the compression ratio resulting in much higher efficiency. The position and relation of engine parts on the intake, compression, power and exhaust strokes are shown in Figs. 4 to 7 inclusive. From these it can be seen that

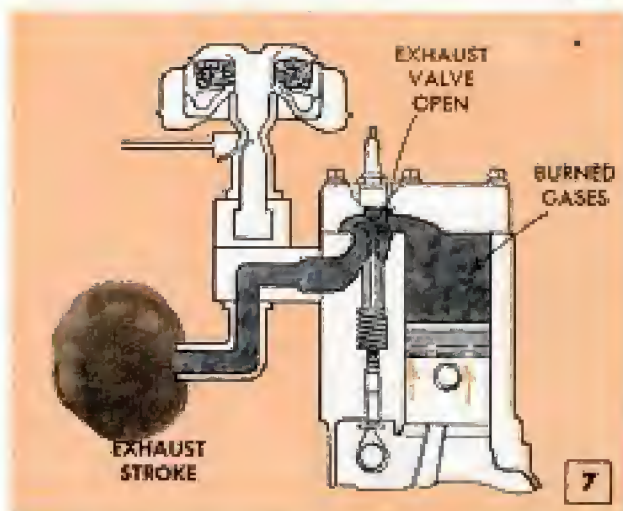
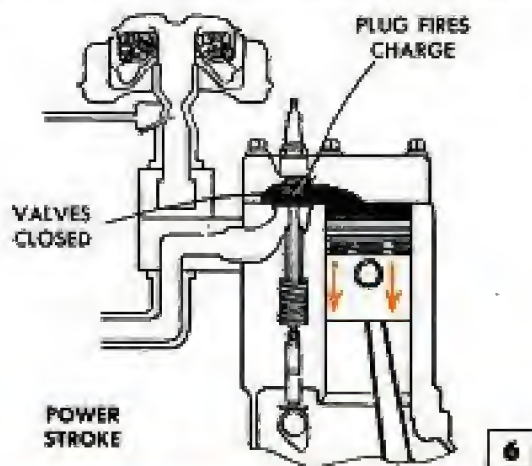
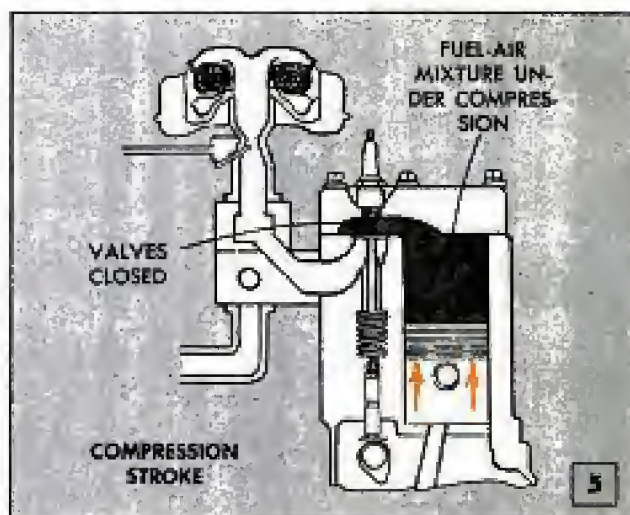
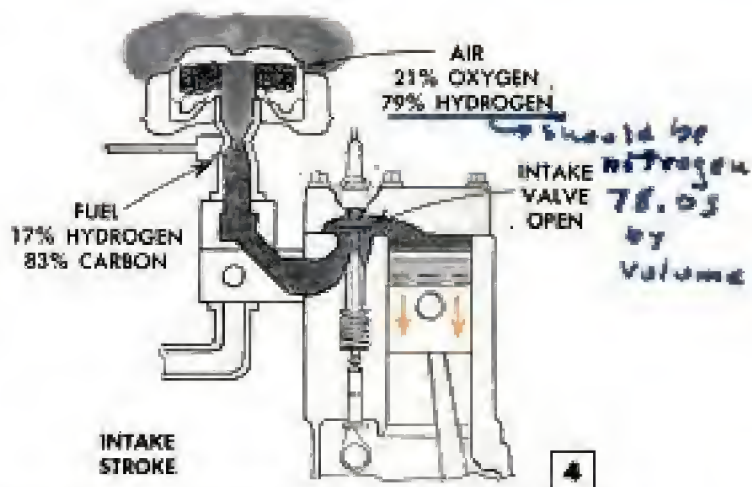


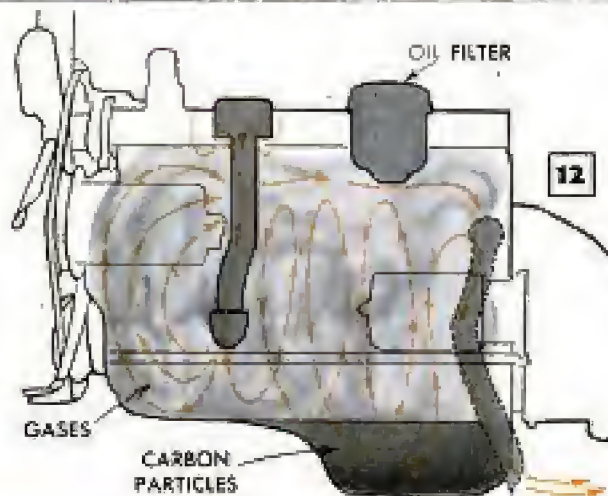
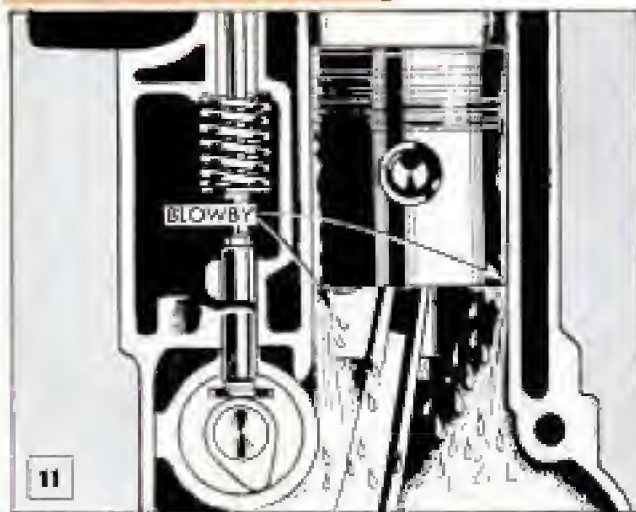
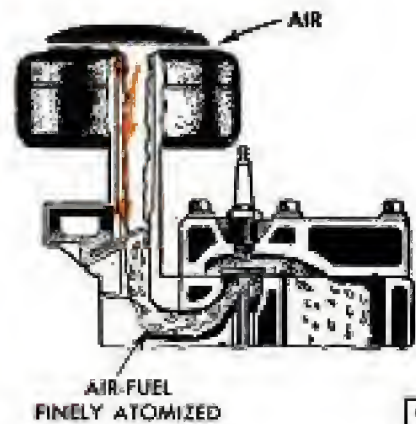
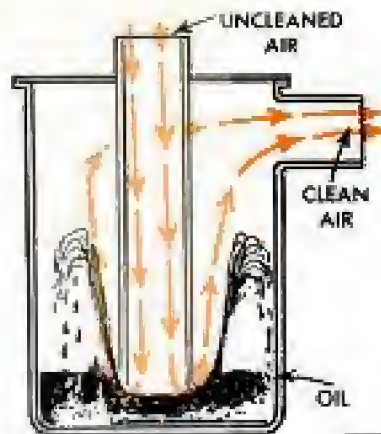


uniformity of compression in engines of the latest types is of the greatest importance. Engineers and mechanics generally agree that the maximum allowable variation in compression pressures is 10 lb. or less. This means that valves, rings, pistons, plugs and head gaskets must be maintained in first-class condition; otherwise the engine cannot be properly tuned for peak performance. A simple calculation will make clear what a 10-lb. variation can mean. This value represents about 10 lb. per sq. in. Taking the average area of the piston as 10 sq. in. this adds up to a 100-lb. variation in pressure. When the charge is fired, the increase in pressure can build up to 400 lb., which is about the maximum variation the average engine can handle without becoming noticeably rough and inefficient.

It takes a lot of air to keep an engine running smoothly and efficiently, 16 to 17 parts of air to 1 part fuel. Put another way, to burn 1 gal. of gasoline the engine requires about 1230 cu. ft. of air. These values will emphasize the importance of servicing the air cleaner, Figs. 9 and 10. Air cleaners are of the oil-bath type, Fig. 9, and the filter type, Fig. 10. In the oil-bath cleaner, dust particles are trapped in the oil reservoir and it is important to make sure that the oil is maintained at the correct level and, also, that it is changed at regular intervals to prevent an accumulation of "sludge" from building up to the bottom of the air-intake tube. In the filter-type cleaner the filter element should be removed regularly, washed in a solvent and recoiled according to instructions.

One of the products of combustion is water vapor and when this combines with certain other combustion residues present in the engine it forms an acid that will etch bright-metal surfaces. Approximately 1 gal. of water is produced for every gallon of fuel burned, Fig. 8. At operating temperature this remains in the vapor form and passes out of the engine through the tail-pipe and the crankcase ventilating system, Fig. 12. However, short runs in cold weather are not always of sufficient duration to bring the engine to operating temperature. During the warm-up period there is a certain amount of blowby, Fig. 11. This passes the piston in the form of raw fuel and the products of incompletely burned fuel, particles of carbon and resins. Contamination of the oil in the crankcase results, as most of these by-products reach the crankcase in the liquid form rather than as a vapor, which would be removed by the ventilating system. When the car must be driven under these conditions, it is advisable to install a high-temperature thermostat in the cooling system and check



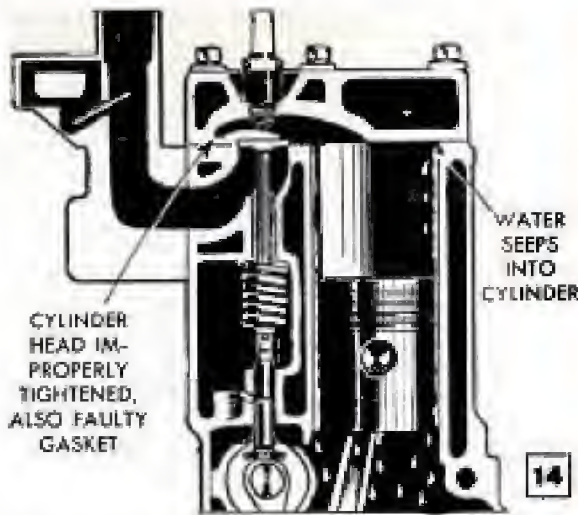


the heater valve on the exhaust manifold at regular intervals. These simple precautions will assure fast warm-up and less acid damage to the engine. Acid-neutralizing crankcase oils are often recommended for cars driven under these conditions.

Nearly all cars with automatic transmissions come equipped with hydraulic valve lifters. Any condition that tends to produce excessive formation of sludge will affect the proper operation of the lifters. On cars using the same oil in the transmission and crankcase it is necessary to change the oil filter every 5000 miles or less, according to the manufacturer's instructions. Cars driven far enough and fast enough to bring the engine temperature to normal and hold it at this level for a period of time will show very little wear due to sludging, even after many thousands of miles. High-detergent oils should be used according to the manufacturer's instructions. When used in accordance with recommendations they are good engine cleaners and, ordinarily, car owners need not be alarmed when an examination of the dipstick shows the oil to be quite dark a short time after an oil change, Fig. 13. However, in older engines in which a detergent oil is used for the first time, the oil on the dipstick may appear to be somewhat thicker than normal and also heavy with grit and carbon. When this is the case, bring the engine to operating temperature and drain and replace the oil immediately.

When there appears to be excessive sludging in an engine in good condition it's well to keep in mind the possibility of a leak through the cylinder-head gasket, Fig. 14. If the oil appears milky or just mildly cloudy, a gasket leak usually can be suspected. The gasket should be replaced.

Another cause of blowby and the resulting excessive formation of crankcase sludge is defective spark plugs, or the use of plugs of the incorrect heat range for the engine and the type of driving. Note the mechanical difference between the hot and

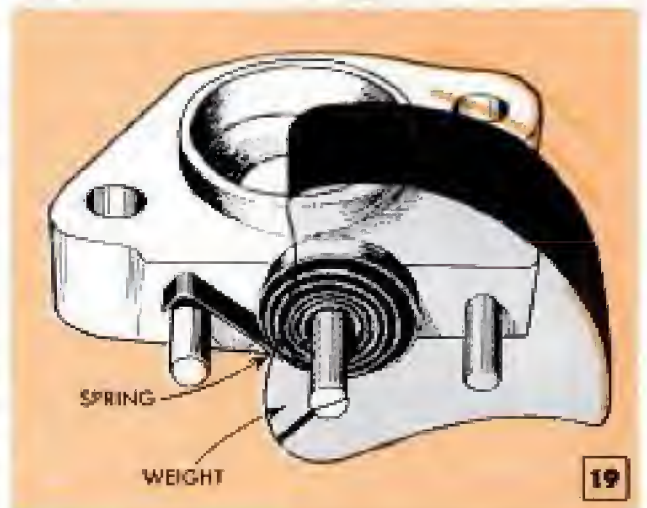
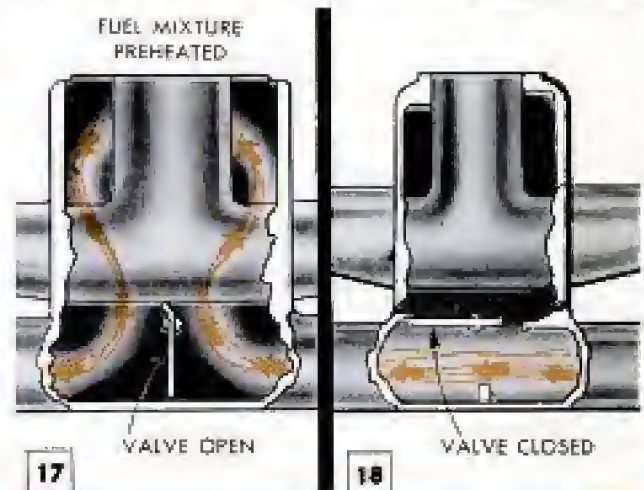
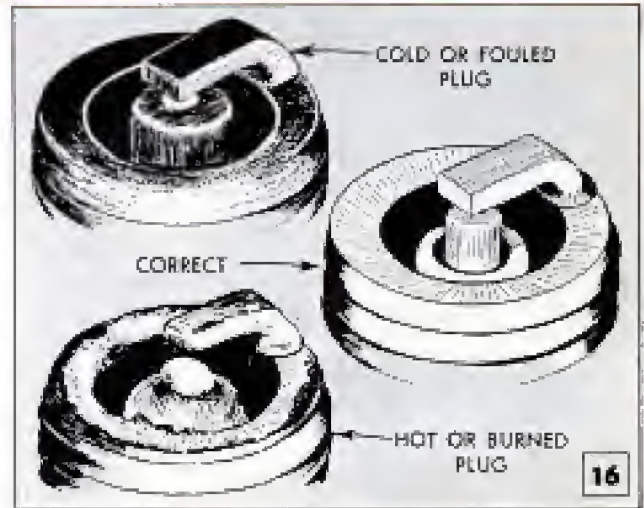
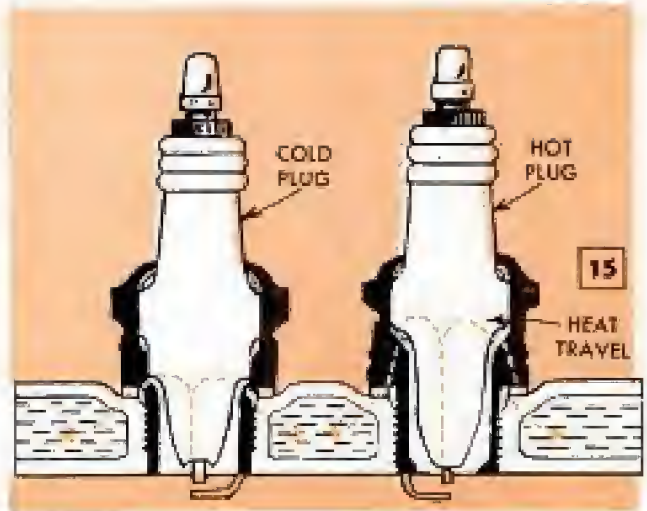


cold plugs detailed in Fig. 15. If you make long trips daily at cruising speeds you probably will be safe in using a cold plug both winter and summer. On the other hand, if most of your driving is intermittent and then only short trips, including an occasional long period of idling, use a hot plug. The tip of a plug that is firing regularly generally will be coated with a light-gray residue of an ashy consistency, Fig. 16. If the residue is white or blistered, the plug is running a little too hot. If the tip is black and sooty, the plug is too cold. However, it should be kept in mind that what appears to be a faulty condition of the plug may be due to an engine defect such as stuck or poorly seating rings, worn or burned valves and, in rarer instances, a clogged air cleaner. Such defects must be corrected for efficient plug performance.

All late-model car engines have a heat-control valve built into the exhaust manifold. Fig. 17 shows how this valve directs hot exhaust gases around the intake manifold to preheat the fuel mixture during the warm-up period. As the engine warms to operating temperature, the valve gradually moves to the fully closed position in Fig. 18, permitting the burned gases to pass directly through the exhaust manifold. The correct operation of this valve is essential for quick warm-up and smooth, economical operation of the engine. If the valve should stick in the open, or hot, position the engine will lose power and may overheat. This is due to overexpansion of the fuel charge before it reaches the cylinders. This, in turn, results in a loss of compression. If the valve sticks in the closed position there will be a waste of fuel nearly equivalent to that caused by running with the choke partially or fully closed.

Fig. 19 shows one type of heat-control valve. The location of the valve and the shape and size of the exterior parts varies in different cars. Check periodically to see that the weight moves freely. ★ ★ ★

Certain illustrations and technical information courtesy of Chrysler Corp., Ethyl Corp., and AP Parts Corp.

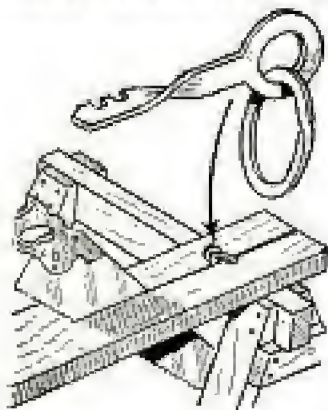


## Ant Colony Destroyed by Fumes Pumped Into Hill



The fumes of any one of several chemicals, such as gasoline, carbon tetrachloride and various types of DDT solutions, will destroy ants if the fumes are forced into the ant hill under pressure. This can be done with a tire pump. Solder the valve stem from an auto-tire tube over a hole punched in the bottom of a tin can or small pail. In use, a rag saturated with chemical is placed over the ant hill, the tin can is held tightly over the rag and air pressure is supplied by a tire pump. The pump need be worked only a few minutes since the fumes will be forced into the ant hill by only a slight increase in air pressure. Note: Observe caution when handling any volatile liquid since the fumes are dangerous in confined areas.

## "Pocket Size" Ripping Wedge Bent From Flat Key



A practical ripping wedge, which can be carried in your pocket or on a key chain to be handy at all times, can be made by giving a half-twist to the shank of a flat key. The wedge also could be cut from heavy-gauge sheet metal.

## "Off" Indicator for Range

If your electric-range dial does not have control lights, paint a wedge-shaped arrow

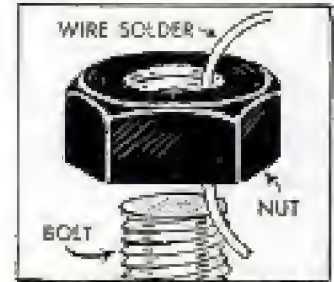
with bright nail polish at the top of each dial. The point of the wedge is directed at the dial and will indicate at a glance whether the burner is off or not.

Lester Schultz, Cicero, Ill.

## Solder Permits Emergency Use Of Nut With Worn Threads

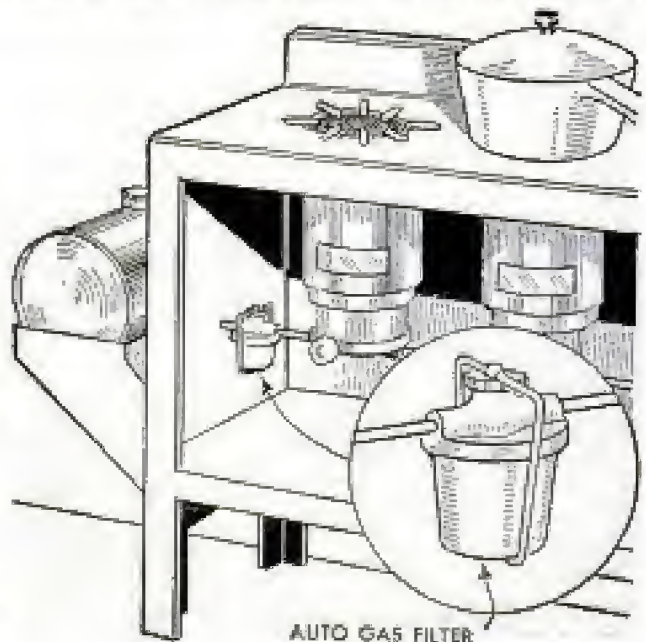
In an emergency a nut in which the threads are badly worn can be used by tightening it on the bolt over a short length of wire solder. The solder will be forced into the worn threads where it will take up the slack and permit the nut to be tightened.

Hugh Lineback, Stillwater, Okla.



## Filter in Kerosene-Stove Line Prevents Clogged Burners

The burners and fuel lines of a kerosene stove not already equipped with a filter can be kept free of clogging sediment by installing a filter of the type used for automobile gasoline lines. The filter is sold as an accessory to be connected in the gasoline line between the carburetor and the fuel pump; it contains a filter element of either ceramic or metallic material. To install it in the stove, the line between the tank and the first burner is removed and replaced with shorter pipe nipples and a union to accommodate the filter. Periodic cleaning of the filter is done by removing the filter bowl and washing it and the filter element with gasoline. If available, compressed air can be used to blow dirt out of the element.



POPULAR MECHANICS



# LOCATING FACEPLATE for Your Lathe

**S**SMALL SHOPS having limited equipment frequently encounter problems of precise hole location and spacing on jigs, fixtures and other close-tolerance parts where it sometimes is necessary to hold finish dimensions and spacings to .0005 or less. One machinist solved the problem by improvising a locating faceplate consisting of two principal parts, a sliding member which can be positioned laterally with relation to the axis of the lathe and a multi-tapped faceplate which is furnished as a lathe accessory. The slide can be located within very close limits by means of stop blocks of known dimensions. Only general over-all dimensions and machining instructions are given in the details as some adaptations must be made to suit the work to be done, also certain variations must be made to adapt the unit to use of lathes of different swings. As dimensioned, the unit is suitable for use on a 9-in. lathe.

The accuracy that can be expected of the unit is proportional to that built into it.

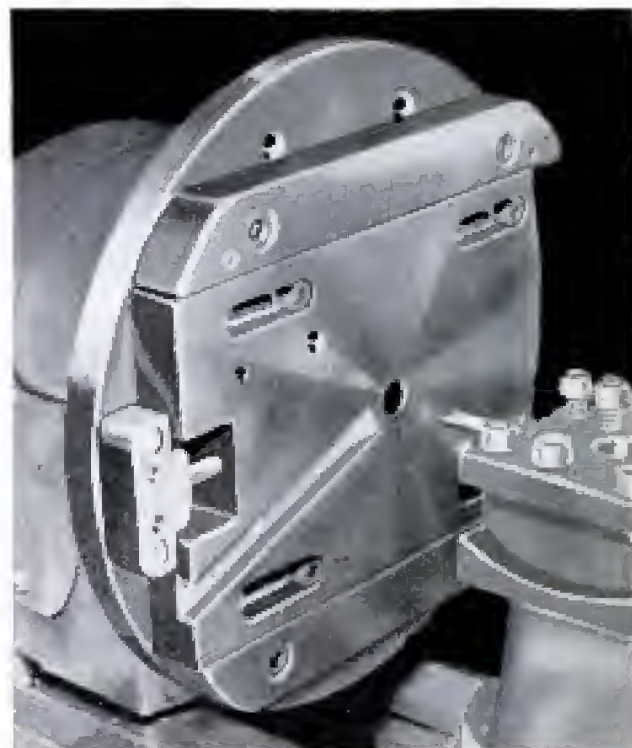
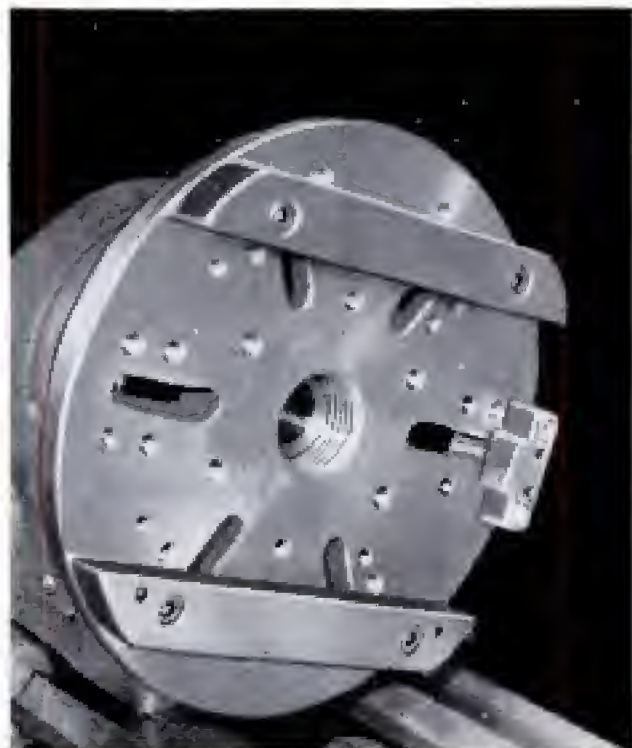
Guides and the fixed stop are doweled to faceplate. Ends of guides are machined to faceplate radius.

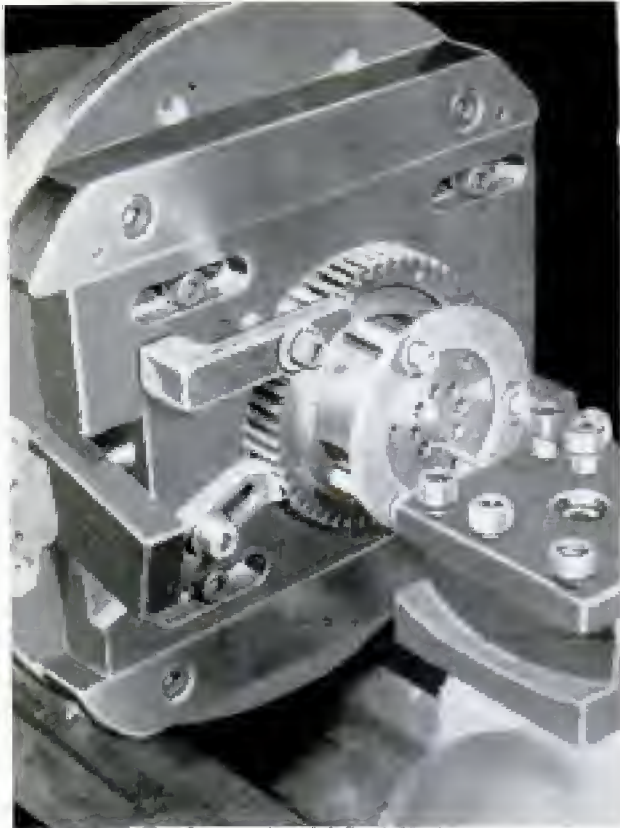


By J. C. Magee

Note in the details that the slide and the rails, or guides, are specified as cast iron. Tool steel or even mild steel can be used, although the latter would not ordinarily be recommended for extremely fine work. In any case, the parts are machined and ground all over with parallel faces, sides and ends. Also it is necessary to check the

The slide mounted and clamped in place for boring  $\frac{1}{8}$ -in. hole. Slot ordinarily is milled after boring.



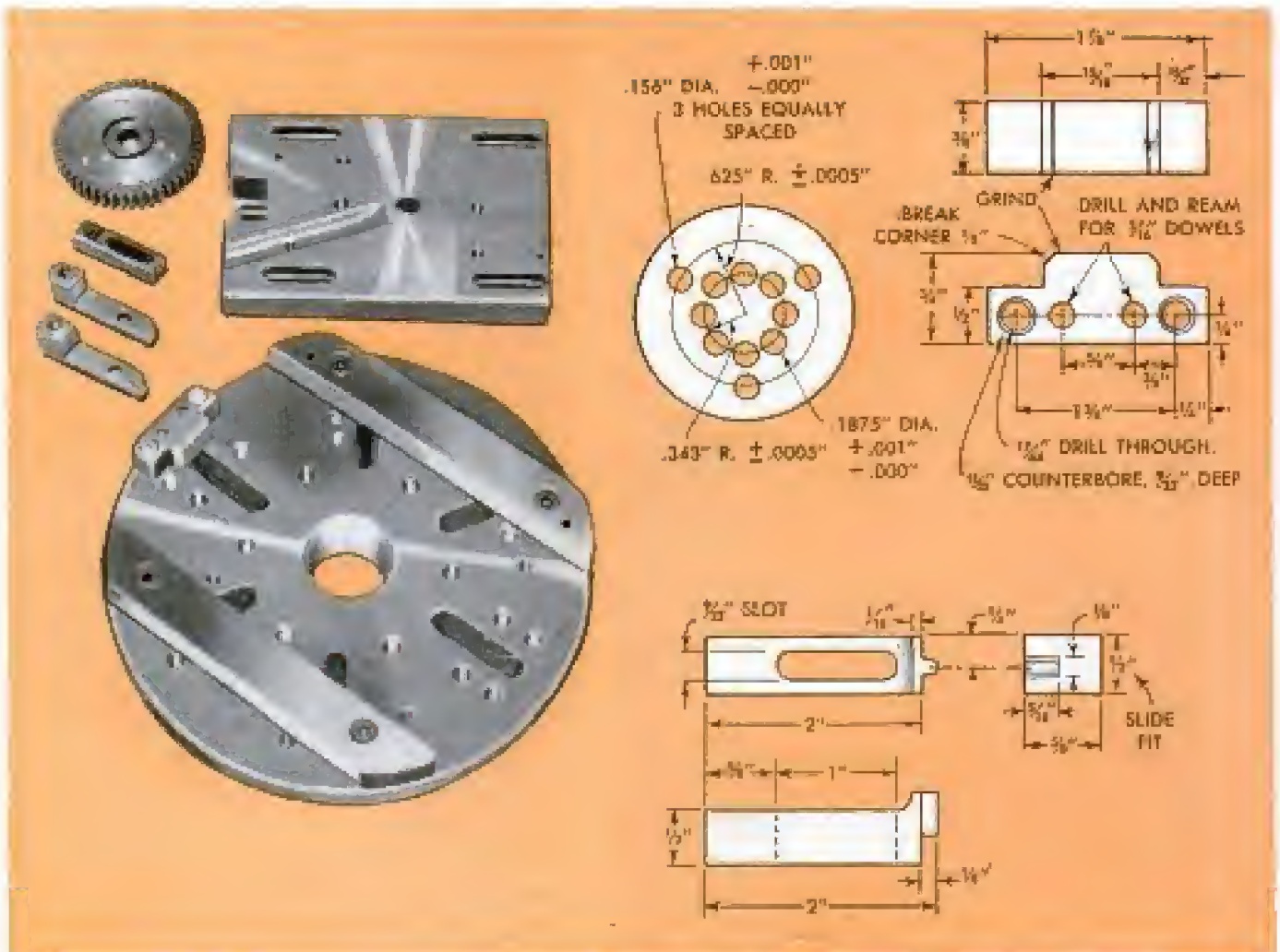


Holes being indexed and bored on concentric lines. Work is held in place with a ring clamp. Gear rotates on  $\frac{1}{2}$ -in. spindle. Note position of indexing bar and use of spacer block to locate the slide

faceplate with a dial indicator to determine the degree of runout. If there is an error, it should be corrected by machining and grinding the face of the plate. Clean the threads and the hub shoulder thoroughly before running the test.

All four parts of the slide mechanism are attached to the faceplate, the two guides and the stop being positioned by  $\frac{3}{16}$ -in. dowel pins and held in place permanently by sockethead setscrews. The stop, upper right-hand detail below, is attached after the slide is in position so that it can be squared with the stop pin in the slide. The slots milled through the slide also are step-milled to a depth equaling the length of the sockethead of the setscrew plus  $\frac{1}{16}$  in. for clearance of the head below the surface of the slide. If a flat washer is used under the screwhead, an additional allowance must be made. Some mechanics would prefer to lap the slide to the guides but, for average use, suitable sliding surfaces can be produced by fine grinding before assembling and dowel-pinning to the faceplate.

The sliding index bar, lower detail on the opposite page, is formed on a shaper to fit in the slot milled from one edge on a center line passing through the center of the  $\frac{1}{2}$ -in. hole in the slide. Ordinarily, this

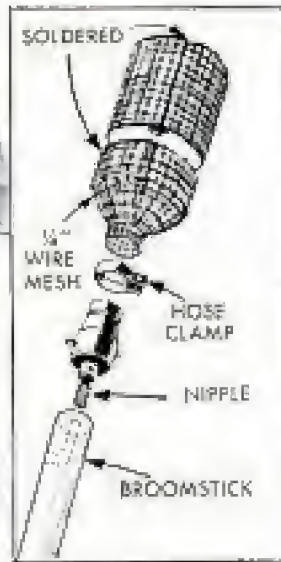




# Trouble Light on Pole for Hard-to-Reach Places

You can make this handy trouble light for exploring dark corners and out-of-the-way places by mounting an electric-light socket on a pole handle. The handle, which may be cut from either a dowel or broom-

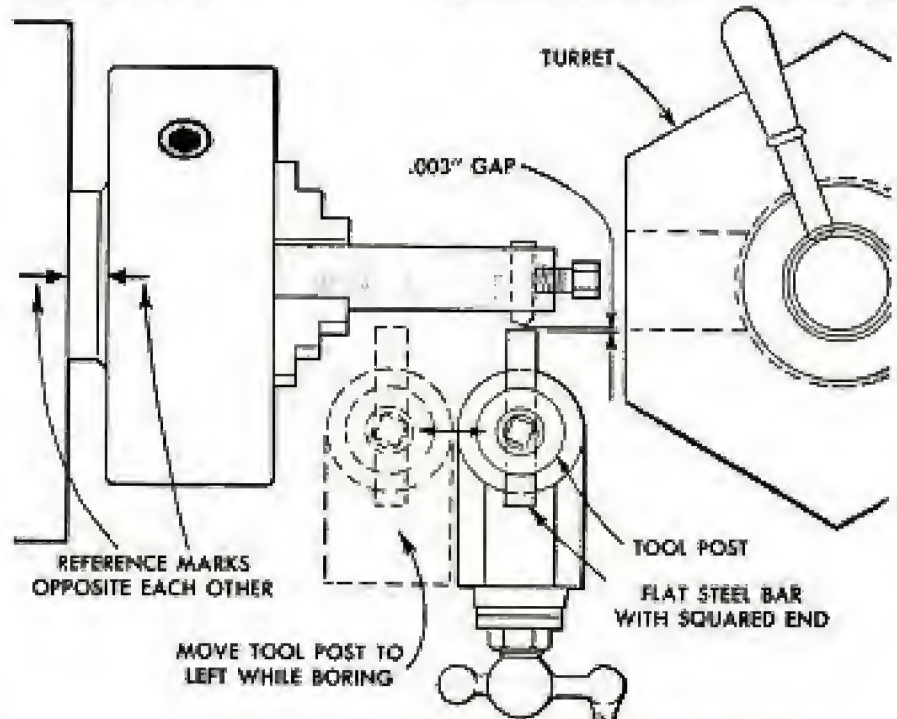
stick, is drilled at one end to take a 1/8-in. pipe nipple screwed into the wire outlet of the socket. A strong connection can be made by drilling the hole slightly under-size and turning the nipple as it is forced into the hole so it cuts threads in the wood. Another hole is drilled at a right angle to the first hole to permit the cord from the light socket to be run through the pipe nipple and back along the handle. The cord is stapled to the handle to prevent it from becoming entangled with any obstructions. A light-bulb guard is improvised from pieces of 1/4-in. wire mesh which are soldered together after being shaped. — George Kapitan, New York City.



# Feeler Gauge Insures Accurate Boring of Turrethead

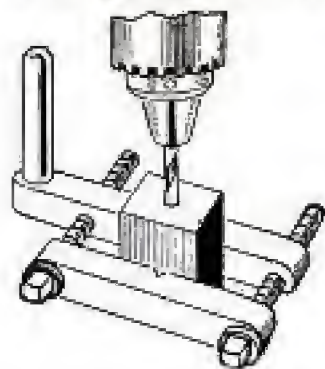
Confronted with the problem of boring holes to a tolerance of plus or minus .003 in the turrethead of his lathe, one machinist who had only a straight-cutter boring bar used a length of steel bar and a feeler gauge to achieve the required accuracy. The boring bar is inserted in the chuck with the hole in the bar in a horizontal position. Reference marks are made on the chuck and headstock, and the cutting tool is set to bore about 1/16 in. undersize. Then, with a short length of flat-steel bar locked in the tool post, move the carriage so the bar is in line with the cutting tool. Hold a .003 feeler gauge against the cutter and run the cross-feed up until the flat steel just contacts the gauge. Moving the feeler gauge up and down with the fingers will indicate when the flat bar and the cutter are just contacting the gauge. Clamp the flat bar tightly in the tool post, note the micrometer reading of the cross-feed sleeve and remove the feeler gauge. Then move the tool post from the cutter and start boring. Measure the diameter of the bored hole. To increase the diameter ac-

curately, move the tool post back to align with the cutter and back it out to the desired amount by watching the micrometer reading on the cross-feed. Rotate the chuck to bring the two reference marks in line, loosen the cutting tool and gently push it to contact the .003 feeler gauge held between it and the flat bar. Tighten the tool bit, remove the gauge and start boring again. It is important that the tightness of the feeler gauge is the same both times. Kenneth Loo, Lawndale, Calif.





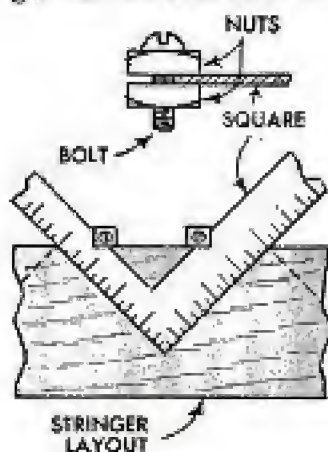
## Clamp-Type Lathe Dog Provides Emergency Drill-Press Vise



In an emergency, when no drill-press vise is available, an ordinary clamp-type lathe dog can be used to hold small work to be drilled. Square, round or irregularly shaped work can be accommodated.

## Bolts Modify Framing Square For Marking Duplicate Angles

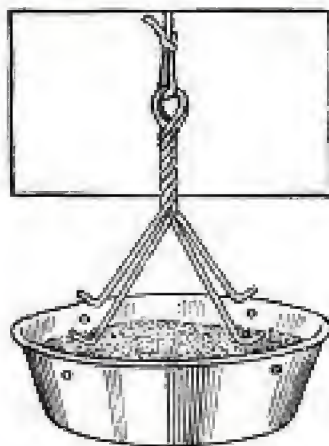
Two stove bolts, each fitted with two square nuts, will permit using a framing square as a gauge to duplicate a number of angles, as when cutting stair stringers or rafters. Place the square at the desired angle on the board and slip the two bolts onto the inside edges of the square. Make sure the nuts are resting flat on the board, then tighten the bolt with a screwdriver. The square now can be moved along the edge of the board for marking the duplicate angles.—



Louis Booker, Louisville, Ky.

## Wire Hooks on Poultry-Mash Pan Permit Removal When Cleaning

If it is rigged so the suspending wires are easily detached, the swinging mash pan in the poultry house can be cleaned more quickly and with less work. Wire hooks are provided by twisting together two doubled strands of wire of equal length. The free



lower ends of the wire then are bent upward to form four hooks which engage holes punched in the rim of the pan. The wires are bent outward slightly to provide a tension for holding the pan; a light hand pressure then will release the hooks from the pan.

DECEMBER 1954

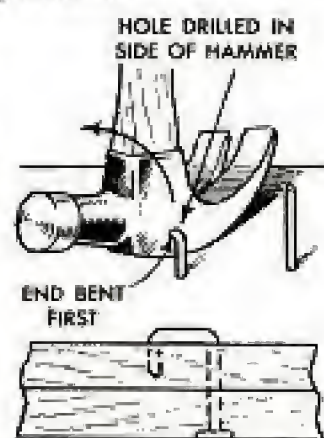


## Slotted Sections of Steel Oil Drum Utilized as "Stile" Over Fence

In a location where a regular gate is not practical in a barbed-wire fence, but where it is necessary to cross the fence frequently, a "stile" can be made by cutting an empty steel oil drum into two sections. One section should be about twice the length of the other, and both sections are slotted to fit over the wire. Half the surface of each drum thus sits on either side of the fence to provide steps on both sides.

## Hole Drilled in Hammer Head Speeds Clinching Nails

If you have frequent occasion to clinch nails, a small hole drilled in the side of the hammer head will aid in doing the job more quickly and neatly. The end of the nail is caught in the hole and bent back, so that the point will penetrate the wood when the extending nail is hammered flat. Drill the hole just slightly larger than the size of the nails most commonly used.



When installing pipe covering, use a miter box and a hacksaw to get straight cuts and to prevent crushing of the covering in a bench vise.

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# 5¢ WORTH OF ELECTRICITY

*How to Calculate Home Power Costs for Modern Lighting and Appliances*

By J. B. Mullen

**WHEN YOU PLAN** to add new home electrical appliances or replace old equipment with more efficient units, it's interesting and often profitable to calculate accurately the total power requirements and, from this figure, average up the costs. In many instances the added wattage will entitle you to a lower rate classification, thus reducing rather than increasing costs.

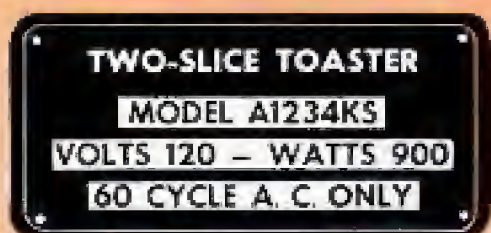
A simple alignment chart you can make yourself will give the answer accurately without any involved computation. For purposes of illustration, suppose that your present rate is 5 cents per kilowatt hour for the first 100 kilowatt hours and 3 cents for over 100 kilowatt hours (k.w.h.). Then you would normally use the 3-cent rate in estimating the operating cost of additional appliances. On the other hand, if you are estimating the cost of operating present equipment or replacements, it usually is better to determine an average rate. This

can be obtained by dividing the total bill by the total number of kilowatt hours used. In some cases the total may place you in an even lower rating. However, it should be understood that rates vary. Those given are only representative.

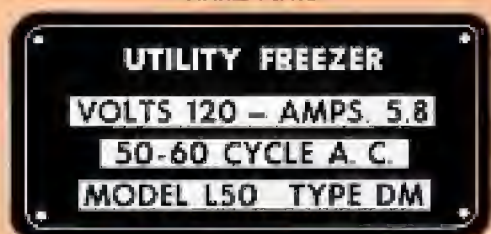
The table below lists average wattage requirements for common electrical appliances. Name plates on appliances usually give the electrical characteristics, model numbers and types in a manner similar to that shown. A typical example of how computations are made quickly by means of the alignment chart is shown by colored lines on the opposite page. First determine the wattage requirements and the operating time. Connect these two values on the chart by means of a straightedge, noting that a 3000-watt unit operated 20 hours consumes 60 k.w.h. of electricity. Note that the second position of the straightedge gives an operating cost of \$1.50 at a 2½-cent-per-kilowatt-hour rate. Again the values given are only representative, but they do show the very low cost of operating modern home appliances. A more graphic illustration is shown at the top of the opposite page. The appliances pictured can be operated for the time given on approximately 5 cents' worth of electricity at 2 cents per kilowatt hour. ★ ★ ★

## POWER REQUIRED BY TYPICAL APPLIANCES

Appliance	Watts
Range	8,000 - 15,000
Clothes drier	4,400 - 4,800
Automatic washer	600 - 900
Ironer	1,200 - 1,600
Iron	900 - 1,200
Broiler or deep frier	600 - 1,800
Refrigerator	350 - 700
Freezer	350 - 1,000
Radiant heater	600 - 1,500
Toaster	900 - 1,200



FIND WATTS ON NAME PLATE



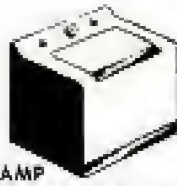
IF WATTS ARE NOT SHOWN USE THE FORMULA WATTS — VOLTS X AMPS.



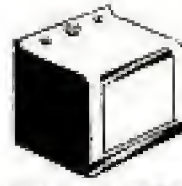
60-WATT LAMP



1000-WATT TOASTER



7-AMP  
AUTOMATIC WASHER



4500-WATT DRIER



300-WATT TV SET



41 1/2  
HR.



2 1/2  
HR.



3  
HR.



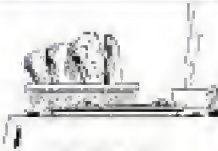
33  
MIN.



8 1/2  
HR.



MORE THAN 3  
WORKING DAYS



200 SLICES  
OF TOAST



5 BATCHES  
OF LAUNDRY

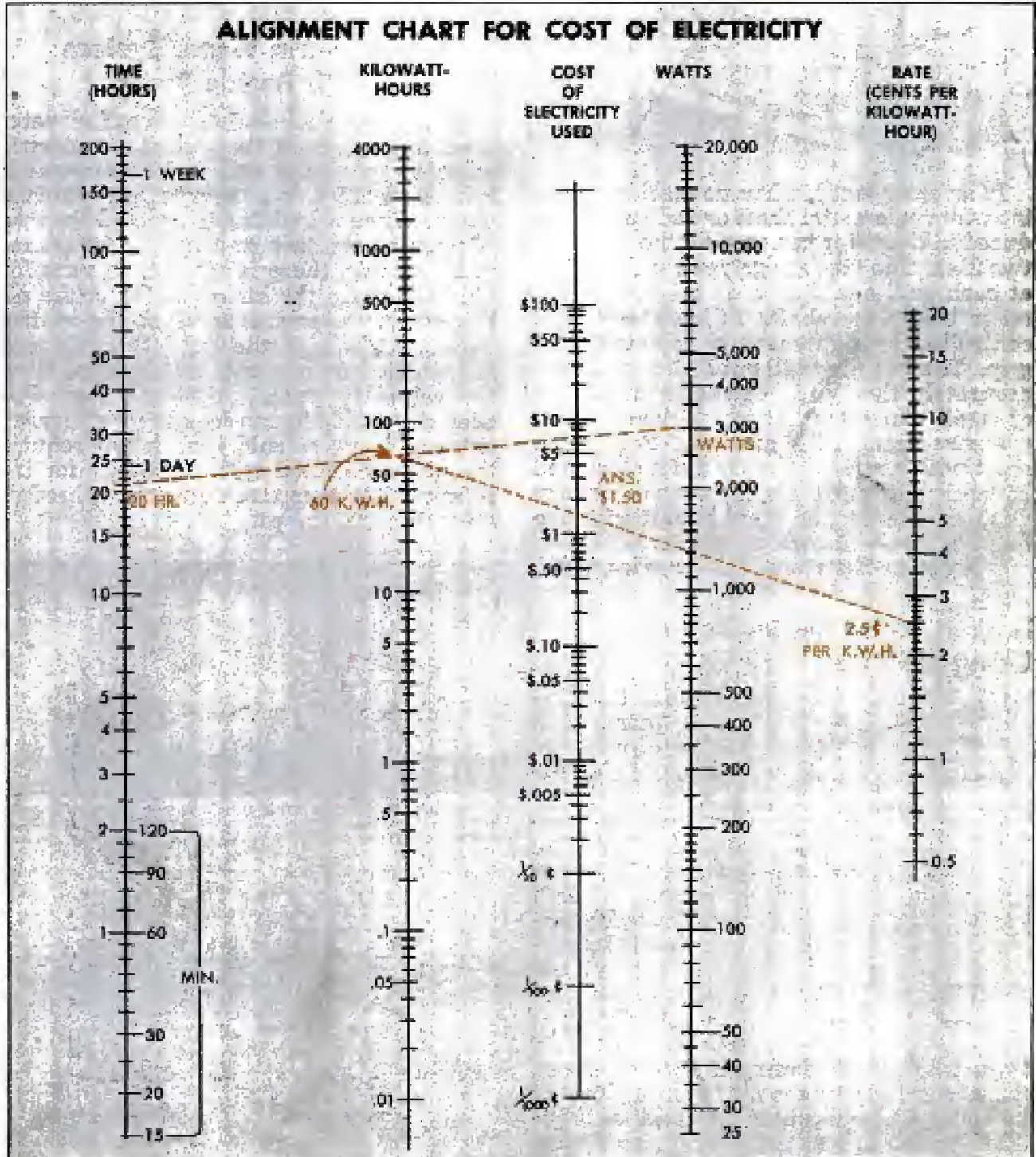


1 BATCH  
OF CLOTHES



DAYS OF  
ENTERTAINMENT

### ALIGNMENT CHART FOR COST OF ELECTRICITY



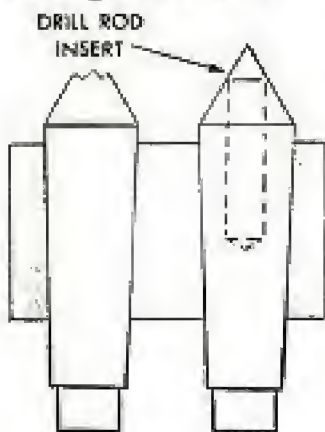
## Diameter of Metal Shaft Reduced In Wood Lathe With Two Files



In an emergency, when no machine lathe is available, a metal shaft or rod can be reduced in diameter in a wood lathe by using two files. The files are gripped with a hand at each end, one file being above and the other below the shaft. Filing pressure is controlled by tightening or loosening the grip. The two files will cut faster and more accurately than one, especially on a shaft of small diameter that would bend under pressure from only one file. Polish the shaft with a strip of emery cloth stretched between the hands. Do not wrap the emery cloth around the shaft and hold it with one hand; serious injury can result.

Ralph C. Tattersall, Los Angeles, Calif.

## Broken Lathe Center Repaired Using Drill Rod



When the tapered point of a lathe center is damaged or broken, it can be renewed by center-drilling the point and inserting a length of drill rod. The lathe center first is annealed, then chucked in the headstock of a lathe and faced off

to just below the damaged portion. Next, the center hole for the new point is located by using a heavy center drill and then finished to the proper depth and size with a

regular twist drill. Drive a length of drill rod into the finished hole, chuck it in the lathe and machine it to 60 deg. When the machining is finished, retemper the point to provide the original hardness.

C. W. Woodson, Chicago.

## Sliding Door Operates Better When Pull-Handle Is Centered

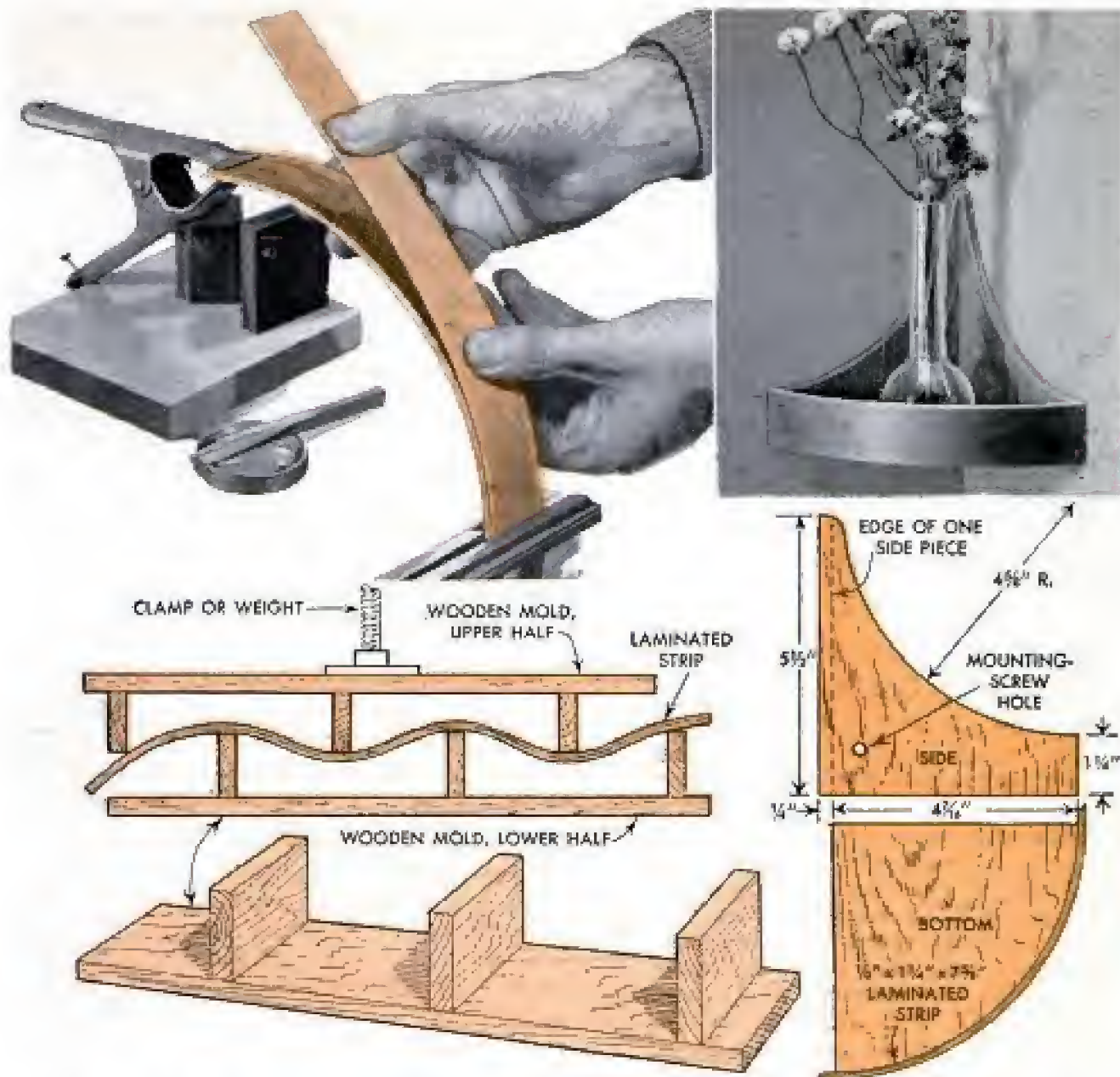
Much of the difficulty in operating a large sliding barn door is due to the fact that the pull is located at one side of the door, throwing most of the door weight on one roller. By placing the pull-handle in the center of the door the weight is evenly distributed on both rollers and the door can be opened more easily.

## Valves for Farm Water System Located in Pit Beside Pump

On one farm all shutoff valves for water lines leading from the automatic electric pump to the house and various out-buildings are located in a concrete pit with the pump. When a building is isolated because of freezing weather or a line or faucet requires repair, there is no need to hunt for hidden valves; the hinged cover of the pit lifts quickly to permit access to the control valves. A drain in the pit floor leads to a tile which carries away any leakage from the valves or pump. Although there has been no trouble due to freezing weather, an extremely severe cold spell might require the pit to be filled with loose hay for insulation. The pump motor is wired through a fuse box in the pit.



POPULAR MECHANICS



## Mold-Bending Small Wooden Parts

By Walter E. Burton

A SCROLLED corner shelf, such as the one shown in the upper right-hand photo, assumes a new and more attractive appearance with the addition of a curved gallery or edging strip that can be made with a simple bending jig. The edging can be made from either a solid piece or a strip of solid stock faced with attractively grained hardwood veneer. Steaming or soaking is desirable when bending solid stock, but a veneered or laminated strip can be bent to the desired curve as it is assembled.

A simple curve can be produced by clamping one end of a wooden strip in a vise and tying or weighting down the opposite end. Holding the opposite end with a clamp fastened to a weighted block, upper left-hand photo, has the added advantage of

holding the ends of the laminations tightly together when a veneered strip is assembled and bent.

Rings, or segments of rings, can be made by bending the strips around a section of pipe, a large tin can or other cylindrical form. Heavy cord or tape is used to hold veneered strips together and on the form.

Single or reverse curves can be bent in a strip by clamping it in a bending jig, consisting of an upper and lower mold, or form, as in the center detail.

In all cases, whether bending a solid or veneered strip, the ends of the finished curve will require trimming and fitting. Therefore, make sufficient allowance by beginning the job with slightly longer materials than required for the finished part.

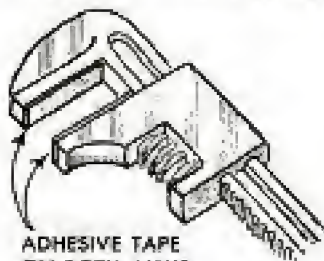


### Guard for Tractor Rear Wheel Lifts Leaning Cornstalks

Leaning cornstalks will not be flattened beyond reach of a towed corn picker if a guard is provided for the rear tractor wheel as indicated. The guard is made from three lengths of pipe, one long pipe being used as a guard, and the other two as brackets. The assembly is welded together, flat-steel plates being welded to the free ends of the brackets for attachment to the tractor frame and rear axle. Although not shown, a piece of steel rod bent to a narrow U-shape is driven tightly into the front end of the guard to slide under the cornstalks.

Ed Mercer, Madison, Wis.

### Taped Jaws of Adjustable Wrench Prevent Damaging Chrome Fixture



An adjustable wrench can be used on chrome-plated fixtures on a sink or wash basin without causing damage if the jaws are faced with strips of tape. Two or more layers of friction or adhesive tape should be used and should be allowed to project slightly beyond the edges to prevent the sharp corners from contacting the chrome.

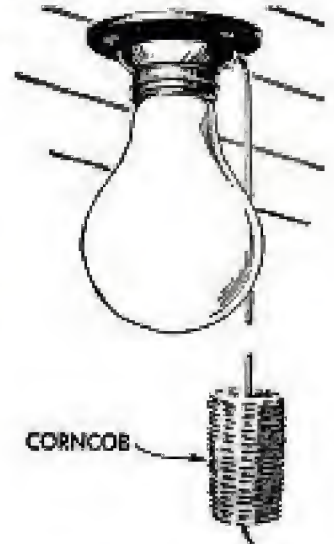
### Sawdust Prevents Egg Soiling

Because of the present practice of grading, mud-stained eggs bring a much lower price, so poultry farmers find it profitable

to keep them clean. To eliminate the mud stains, one farmer has shallow wooden trays filled with fine sawdust or hay chaff mounted on boards in front of the nest. The sawdust adheres to the hens' feet and keeps the mud from the eggs.

### Corncobs Tied to Pull Cords Help Locate Them in Dark

Finding the pull cords of overhead barn lights in the dark was simplified by one farmer who attached corncobs to the ends of the cords. The cords are inserted through holes drilled or punched in the soft core of the cobs. Painting the cobs with white or luminous paint makes them still easier to find.



### Paddles on Tractor-Mounted Auger Force Dirt Away From Hole

Two steel paddles bolted to an 18-in. length of 2-in. pipe, which is mounted on a tractor-drive posthole auger, force the drilled dirt away from the hole and also act as a depth gauge. The paddles are flat steel,  $\frac{1}{4} \times 2 \times 18$ , and are curved away from the direction of rotation to minimize the danger of the operator being injured.



POPULAR MECHANICS

# BRACED FLOORS STRENGTHEN NEW BUILDINGS

By F. A. Strenge

TESTS CARRIED OUT at U. S. Forest Products Laboratory show that diagonal bracing of floors increases wind resistance of large buildings, especially long dairy barns and similar structures which have large areas directly exposed to wind pressure. In such buildings diagonally braced floors transfer the wind load to the end walls and foundation, increasing resistance to bowing, in some cases as much as 30 times. This was determined at the Laboratory by using model floor structures as large as 18 x 48 ft. and applying lateral pressures equivalent to winds up to 100 miles per hour.

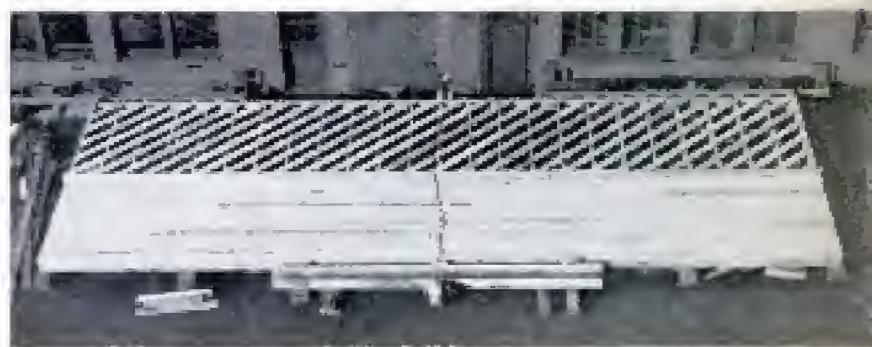
The tests showed that a pair of diagonal braces of 1 x 6-in. stock added greatly to the rigidity of the floor structure when nailed across either the top or bottom of the floor joists as in the upper photo at the right. As pictured, the diagonals extend from the two corners of the frame to the header on the opposite side at approximately a 45-deg. angle. Two 8d nails were driven through the diagonal into each joist.

The researchers also tested floor structures with diagonals spaced various distances apart and all running one way as in the center photo showing a partially completed floor. This gives the same rigidity as a diagonal subfloor with a top floor laid the long way. While this proved by far the stiffest construction, it was determined that sufficient rigidity is obtained from two diagonals in all except extremely large structures. In barns already built it is recommended that diagonal bracing be nailed across the bottom of the exposed joists. In unusually long structures it is advisable to use more than two diagonals. However, it is important that these be accurately spaced and correctly nailed.

The researchers emphasize that this type of bracing is not a substitute for poor construction of the framing in other parts of the structure. All joint fastenings used in framing the building should be of the approved type.



In structures of average size, two diagonal braces have been found to be ample floor bracing for conventional floor framing. Larger buildings and those with long floors require more



Above, a partially completed model floor frame with spaced diagonal braces laid one way under lengthwise flooring. This construction proved by far the stiffest on exceptionally long floor frames. Below, the finish flooring is laid the long way

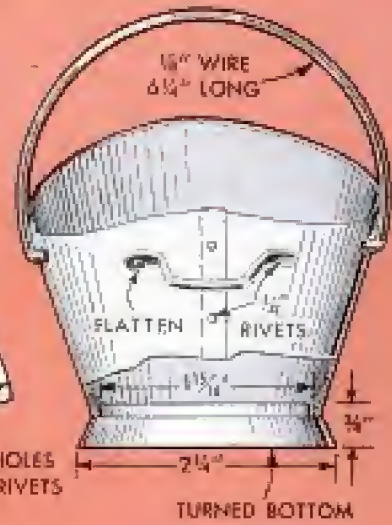
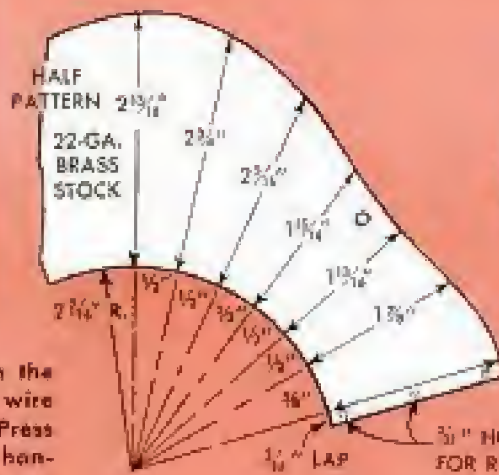


# SIX SLIP-ROLL



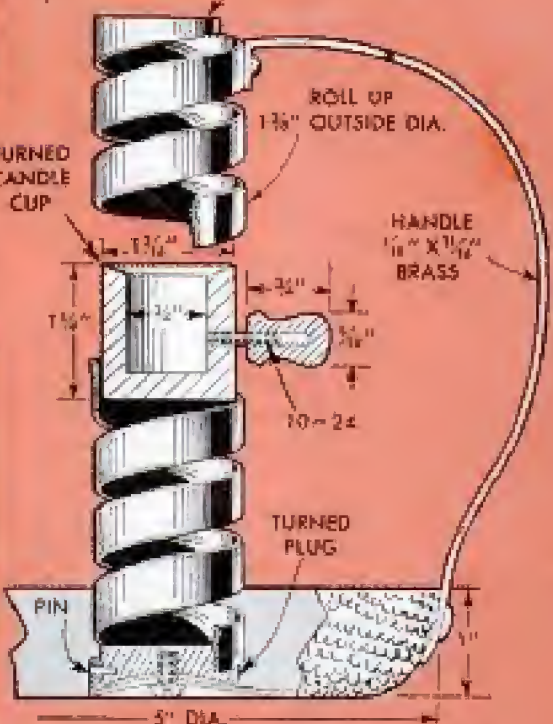
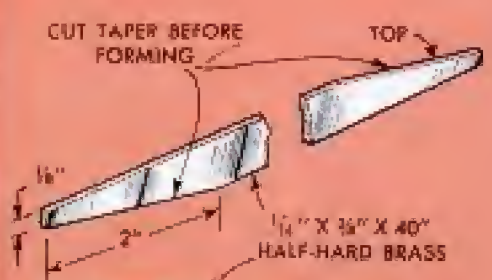
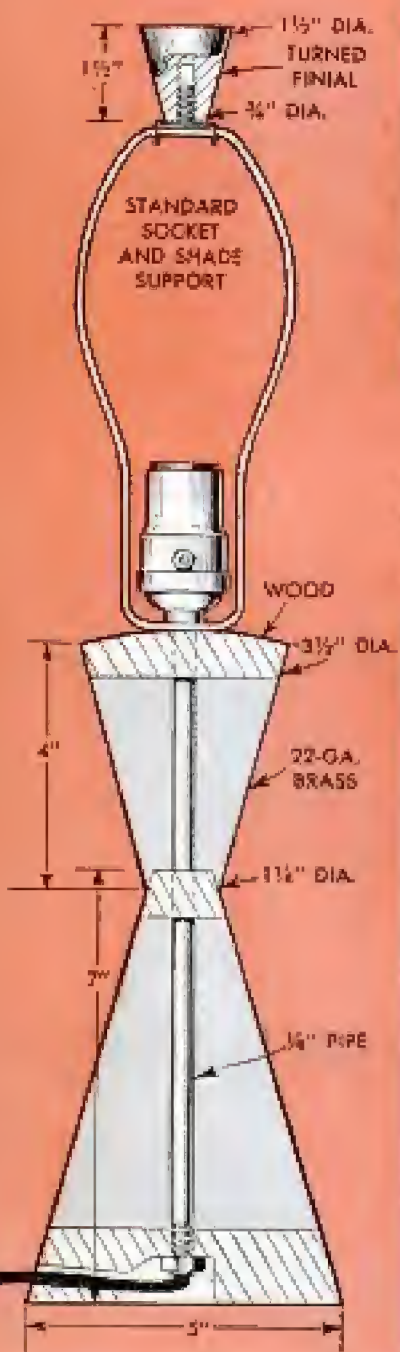
## MINIATURE COAL HOD

Coal hod is a simple roll-up job with the bottom soldered in place. Handle is wire with ends flattened to take rivets. Press sides in slightly before fitting top handle, or bail. Make from brass or copper



## TABLE LAMP

Metal cones forming lamp base are held in place by 1/8-in. pipe. Hardwood inserts center parts when nut at bottom is tightened. Use brass or aluminum



## SPIRAL CANDLESTICK

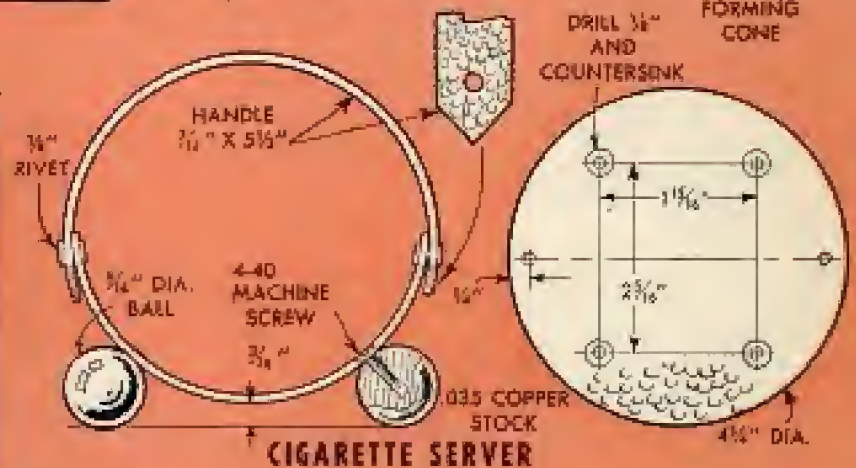
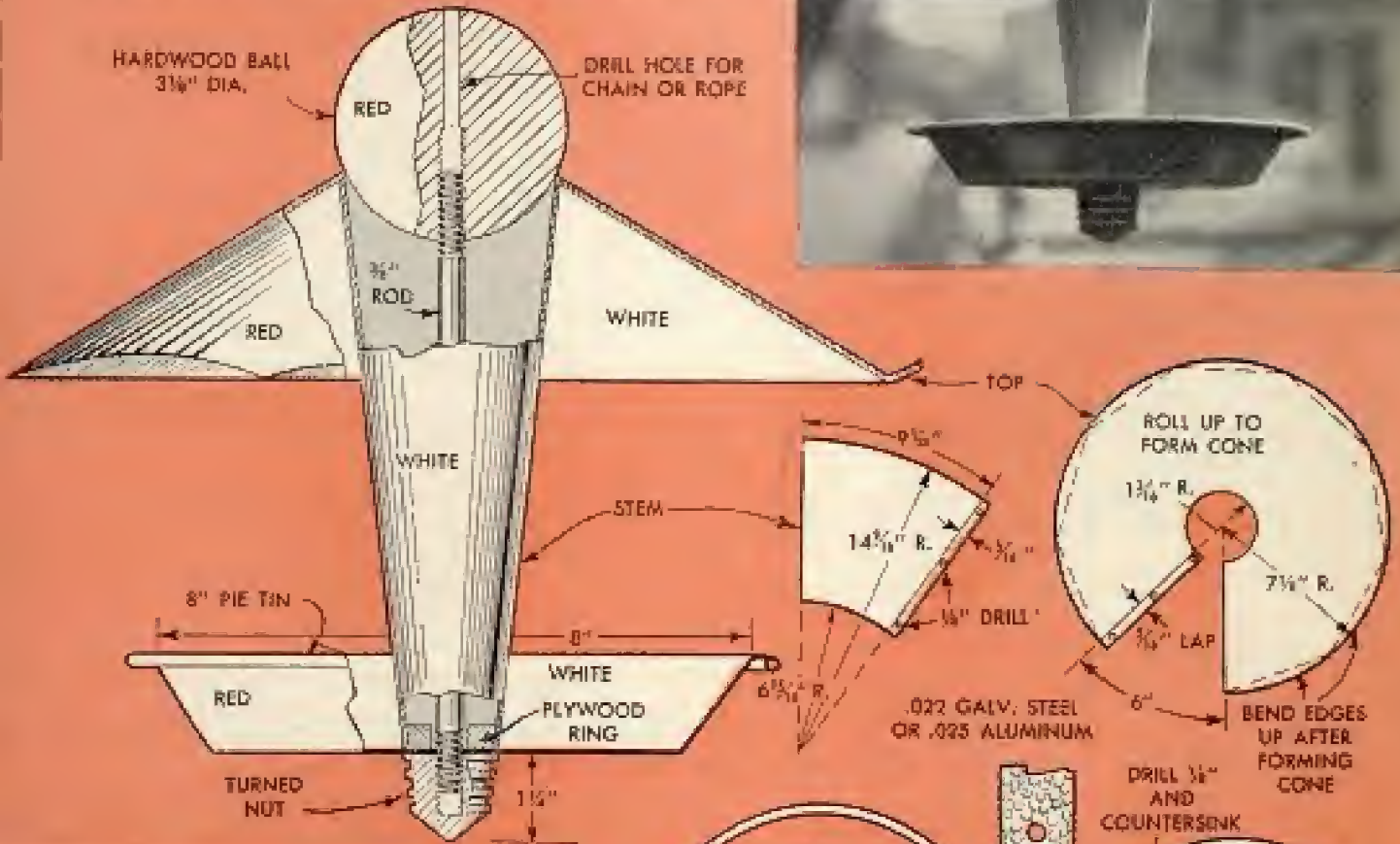
Spiral candlestick is a roll-up job on slip roll, but make a test strip first to make sure of the spacing between turns. Hardwood candle cup adjusts to hold flame at desired level. Note that ends of spiral are tapered before rolling up. In the assembly, the lower end of spiral is pinned to hardwood plug screwed to base. Latter is formed by hammering or spinning in a lathe



# PROJECTS

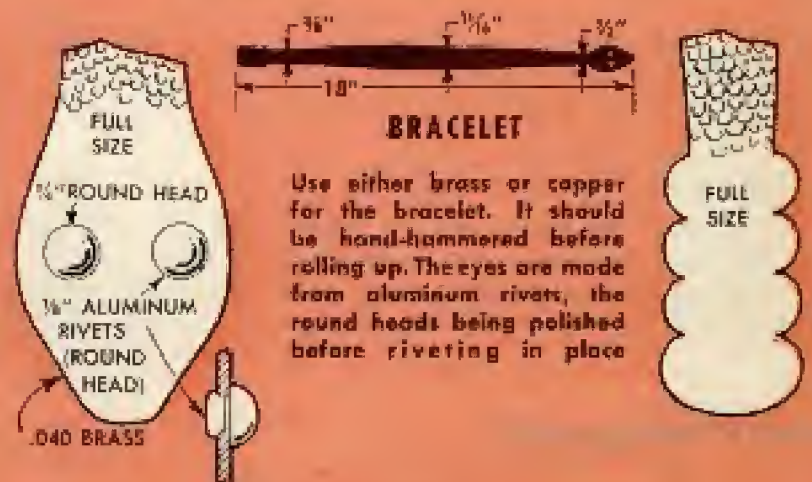
## BIRD FEEDER

Slip roll will not form complete cone, hence a ball top finishes the bird-feeder roof. Lower edge is bent up in 8 sections on brake after cone is rolled and riveted



CIGARETTE SERVER

The cigarette server is a good project for the hobbyist who likes to work in metal. Its easily duplicated parts make it simple to mass-produce the unit with limited equipment. It also can be enlarged, using the same design, to make a handy firewood carrier



BRACELET

Use either brass or copper for the bracelet. It should be hand-hammered before rolling up. The eyes are made from aluminum rivets, the round heads being polished before riveting in place

## Farmer's Portable Air Compressor Utilizes Old Car Parts



To increase the service range of a large air compressor for farm use, the owner mounted the unit on an underslung cart improvised from parts of an old car. Underslung axles were made by welding steel spindles to short lengths of steel channel which, in turn, are welded to the side members of the frame in a vertical position. Pipe spacers welded between the side members also serve as braces. Compressor supports, or feet, are bolted to the frame side members. Vertical members of flat steel welded to the handle bars form a reel, or rack, on which the long power cord and hose line are wound loosely when not in use. A small implement toolbox welded to one of the side frames provides storage for air chucks and a long, valve-controlled air nozzle used for cleaning chaff from radiators.

## Bits of Paper on Press Rollers Removed by Old Toothbrush

Printers will find a discarded toothbrush helpful for scraping bits of torn paper from the rollers of a printing press. This will not only reduce chances of getting ink on the hands but will also eliminate the need for using a knife for this purpose with the resultant possibility of damaging the rollers.

## Thawing Frozen Fuel Line

Unable to start my car one sub-zero morning because of a frozen fuel line, I thawed the line quickly by utilizing the hot exhaust of my neighbor's car which was

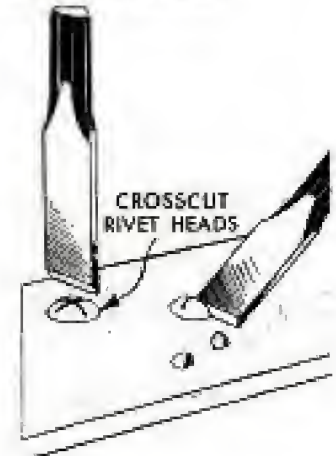
parked in the same garage. To direct and play the exhaust over the frozen line, I used the hose from our vacuum cleaner, pushing it over the tail pipe of the running car. In a matter of minutes, the line was thawed sufficiently to start the engine.

**Caution:** the exhaust gases of an automobile engine contain a high percentage of carbon monoxide which is lethal. Never start a car unless the garage doors are open to provide adequate ventilation.

Donald D. Hubbard, Bellwood, Ill.

## Rivet Heads Cut With Chisel For Quick and Safe Removal

The job of cutting off rivet heads is greatly simplified if the head is first crosscut with a cold chisel. Each quarter of the head then can be chiseled away and the lighter hammer blows required will reduce the danger of flying fragments.



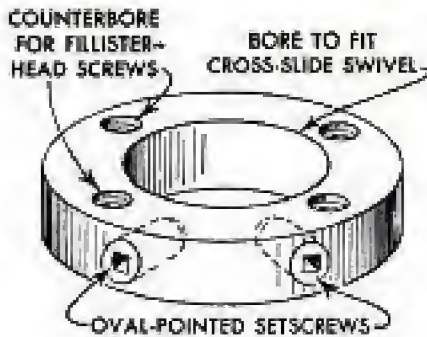
## Hinging Top Portion of Crib Wall Reduces Scooping Height

To reduce labor and speed the unloading of corn from a trailer into a corn crib, one farmer hinged the upper third of the slatted wall. When opened down, the hinged portion had the effect of lowering the wall about 3 ft. and permitted unloading from the full length of the trailer and filling the full length of the crib. When the corn started spilling over the edge, the hinged section was raised and nailed into place and the crib completely filled by scooping the corn over the top of the wall.



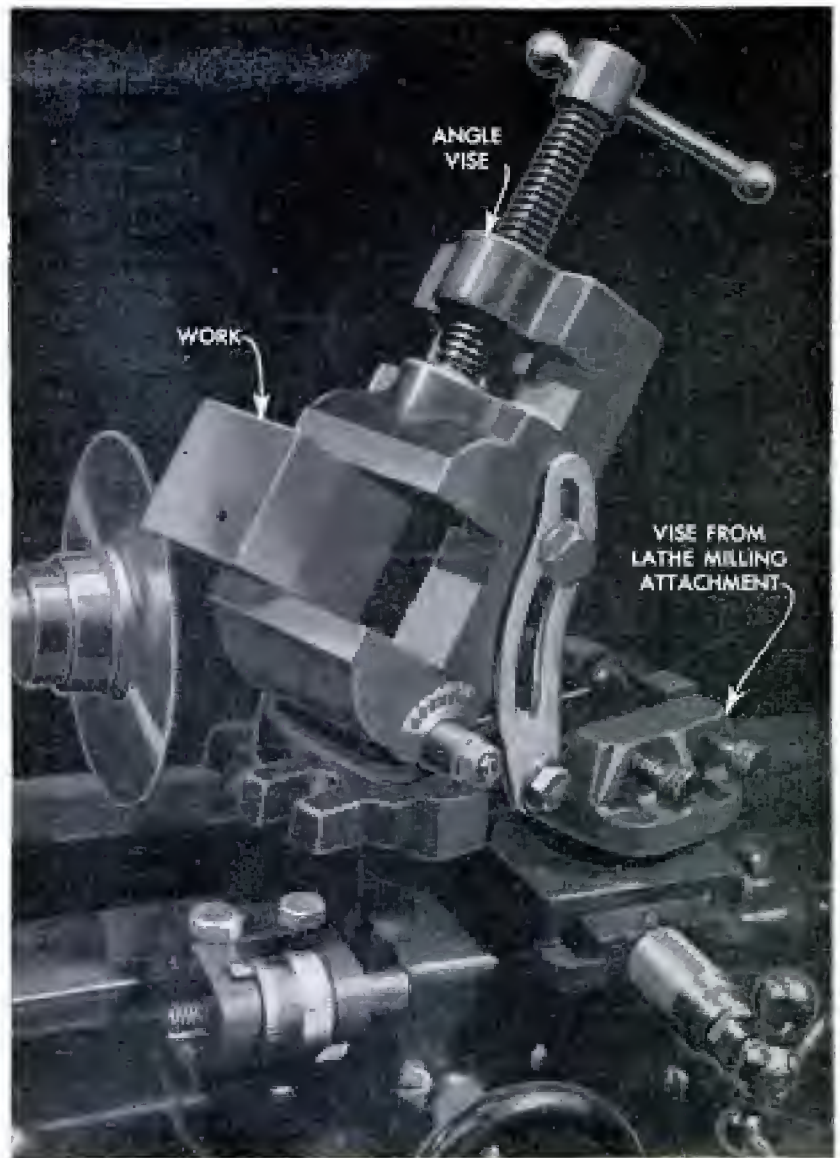
POPULAR MECHANICS

# Compound-Angle Setup Fits on Lathe Carriage



By Hugh Botts

Compound-angle drilling, sawing, milling and grinding can be done in the lathe by mounting an angle vise on a swiveling adapter made as in the detail above. A lathe milling vise is screwed to the adapter which replaces the swiveling base of the compound. The milling vise holds the angle vise rigidly in position for light work. No dimensions are given on the adapter ring, as it must be made to fit the lathe. It should be bored and reamed to a snug, press fit over the compound-swivel boss. When work is set up at a compound angle make sure that all projections are in the clear before engaging the automatic cross-feed on the carriage.



## "Cattleproof" Gate Latch Locked With Steel Pin

Using an eyebolt and an L-shaped pin made from a  $\frac{3}{8}$ -in. steel round, one farmer



has made a simple gate latch which permits easy closing of the gate, but which is shielded to prevent its being opened by livestock. An eyebolt is passed through a hole drilled in the fence post and tightened with the eye in a horizontal position. Two lengths of angle steel are bolted vertically to the gate web to form a channel. Before bolting the angles in place a slot is cut part way across one web of each angle. When installing, the slots are located so that the eyebolt passes through them when the gate is fully closed. When the pin is dropped into the eyebolt and turned flat against the angles, the animals cannot reach it. A length of chain welded to the pin and to the angle prevents loss of the pin.

☛ Table salt, if applied immediately to ink that has been spilled on a carpet, will absorb most of it almost instantly. The salt may be picked up in a vacuum cleaner.

# SHOPPING FOR



**1. CIRCULAR-SAW GUARD** is molded of red transparent plastic that won't shatter, chip or corrode. Guard is formed with an open front and its transparency permits the operator to see cutting operations from any angle as well as from directly in front of blade. Guard raises and lowers as the stock passes underneath. Blade is guarded throughout length of cut.

Shopmaster, Inc., 1214 S. Third St., Minneapolis 15, Minn.

**2. INSPECTION MAGNIFIER** reaches those hard-to-get-at places and illuminates and magnifies tiny parts so that they are readily examined in detail and from all angles. Has a maximum reach of 14½ in. and an over-all length of 17 in. Can be inserted in openings as small as ⅜-in. dia. Unit is fitted with system of achromatic lenses and prisms giving 5X magnification.

Dalzer Sales Co., 2251 W. Pine Blvd., Los Angeles 6, Calif.



**3. POCKET-SIZE LUMBER RULE** reads directly in board feet on even and odd lengths up to 16 bd. ft. Blade can be extended 10 lineal feet and held firmly at any desired point by means of a simple thumb lock. Large, black-on-white numbers make the rule easy to read under difficult conditions. Hook end provides for one-hand use. Steel blade is readily replaceable.

Landscape Corp., P.O. Box 8114, Hialeah, Fla.

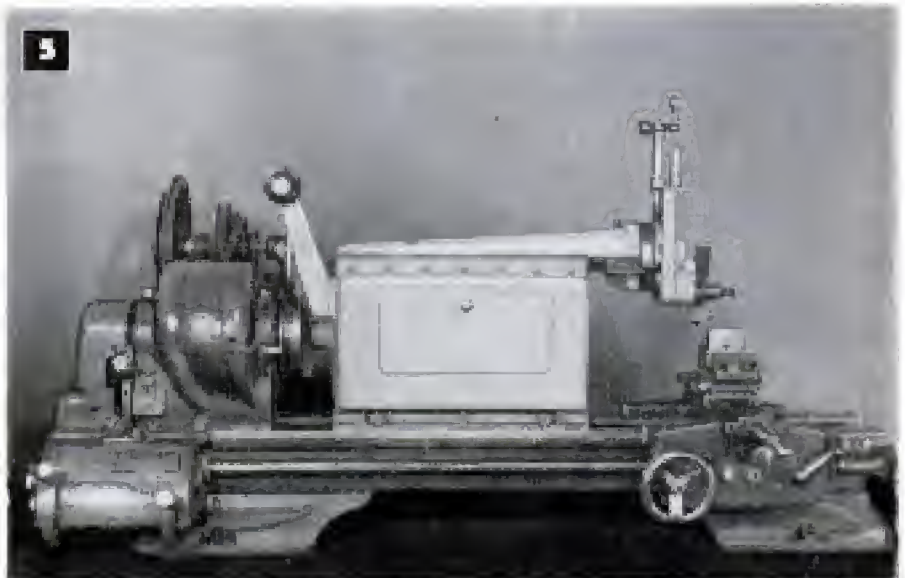


**4. BLADE HOLDER** eliminates the inaccuracies of free-hand sharpening of plane irons, chisels and scrapers. Holds the blade edge true with the sharpening stone and maintains the correct angle on the bevel as the blade is ground or honed. Available in several sizes to take blades of any standard width, either plain or slotted. Especially effective for honing plane irons.

William M. Rosenfeld, 1476 Sixty-Seventh Ave., Philadelphia 20, Pa.

**5. METAL SHAPER AND VERTICAL MILL** mounts on the bed of a small bench lathe as pictured below and on the opposite page. Simple conversion heads make the change from shaper to vertical mill in a matter of minutes. Both units utilize the lathe carriage for controlled longitudinal and transverse feeds. Tool collar is graduated to .001. Head swivels 360 deg.

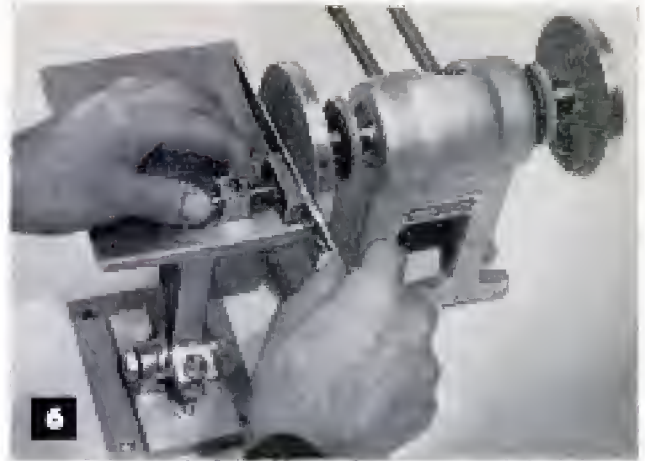
West Machinery & Supply Co., 11 E. Northfield Ave., Livingston, N. J.



# TOOLS

**6. KNIFE GRINDER** has formed wheels that give a hollow grind on tools, shears and instruments requiring razor-keen cutting edges. The fixture, or head, carries two aluminum disks with curved faces on 13, 14, 15 and 16-in. radii respectively. Special abrasive disks are attached to the faces of both disks. A special blade guide assures precision grinding of cutting edges

Treyco Products, 148 Longmeadow Road, Buffalo 22, N. Y.



**7. ONE-TON BENCH PUNCH PRESS** is ideal for short runs on small parts because of its flexibility and the savings possible due to the small size of the dies. In some cases, punches and dies can be made from cold-rolled stock for use on soft metals. The ram moves on machined ways and is provided with a gib for wear take-up. Weighs 105 lb. and requires 1/2-hp.

Alvin F. Allen, 1015 N. Third St., Allen Ridge, Clinton, Mo.



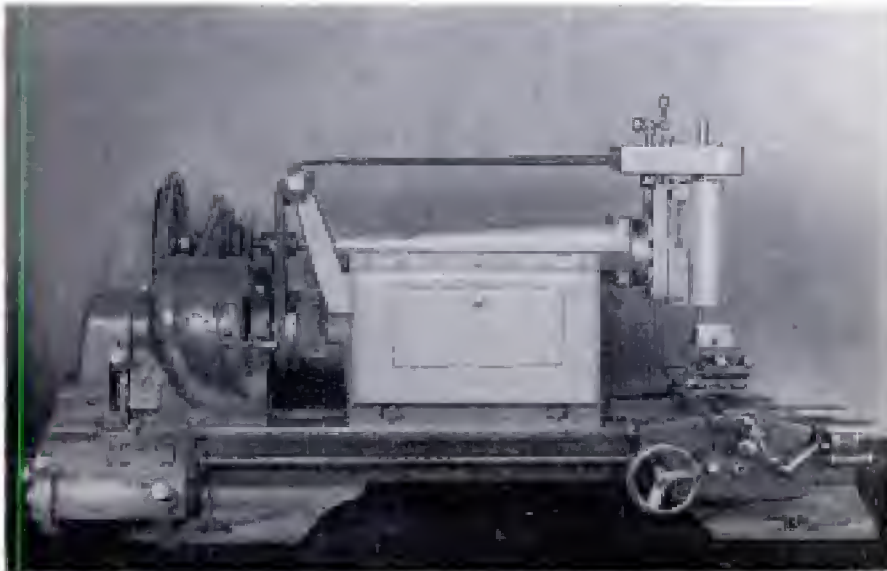
**8. MULTIPLE-PURPOSE ANVIL** has usable surfaces that are rounded, V-shaped, flat, also parallel for all practical purposes. Can be used as a V-block for drilling operations on round stock. Curved surface at one end can be used for making bends to a uniform radius. Curved surfaces also permit its use as a back-up iron, or bumper, for straightening sheet metal

Miracle Mfg. Co., 127 E. Ninth St., St. Paul 1, Minn.



**9. HATCHET-TYPE SOLDERING IRON** outperforms conventional irons on many kinds of work on instruments, electronic equipment and jewelry. Due to its small size and the work angle of the handle it can reach into hard-to-get-at places without requiring the operator to assume fatiguing hand and arm positions. Operates on a.c. or d.c., 110-220 v. Weighs only 3 oz.

Hessman Electric Co., 162 W. Clay Ave., Roselle Park, N. J.



## Durable Rural Mailbox Support From Old Plow Beam



To provide a durable, weather-resistant support for a roadside mailbox, one farmer used a plow beam set on end in a concrete-filled milk can. The mailbox was mounted on the upper end of the plow beam and the milk can partly sunk into the ground to hold it upright.

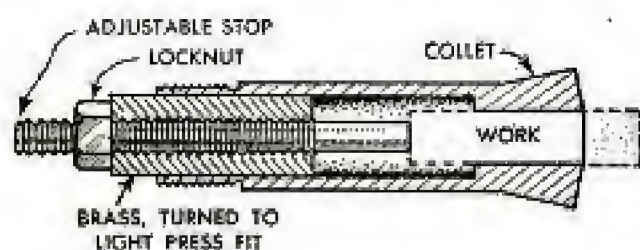
John Krill, North Lima, Ohio.

## Strips of Masking Tape Cut to Uniform Length

Strips of masking tape are cut easily to a uniform length by first tearing off a number of strips slightly longer than the length required and sticking these side by side to a piece of hardboard. Then the strips cut to the required length by means of a straightedge and a safety-razor blade.

## Adjustable Collet Stop in Lathe Aid When Machining Short Rods

Machining a number of short rods or other round stock to duplicate lengths can be done by using the adjustable collet stop shown. The work is inserted in the collet and held lightly against the stop while the collet is tightened. The lathe carriage then



is locked in position and the cutting tool fed to the work in exactly the same location for each piece. The stop consists of a brass plug turned and ground to a press fit in the collet, and an adjustable threaded stop rod held in position by a locknut. The plug is drilled and tapped  $\frac{3}{16}$ -24 to receive the adjustable stop. The stop is shouldered  $\frac{1}{4} \times 1$ " and threaded  $\frac{3}{16}$ -24 for the plug.

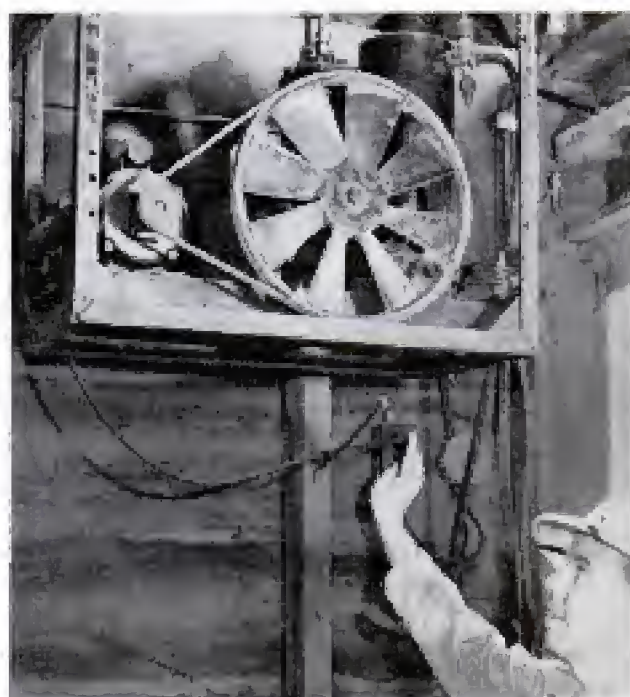
C. W. Woodson, Chicago.

## Worn Pump Coupling Repaired

An emergency repair of a pump-rod coupling that has loosened because of worn threads can be made by lightly pounding the end of the coupling with a hammer. This will upset the threads somewhat and cause a much tighter fit. However, new couplings should be installed as soon as possible to avoid a sudden breakdown.

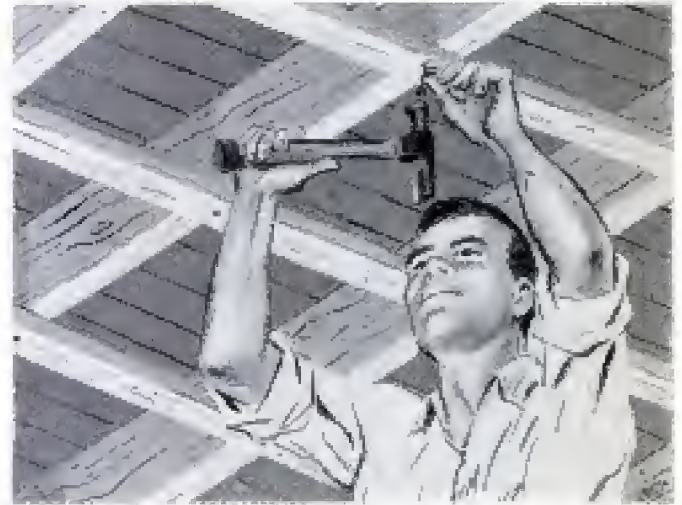
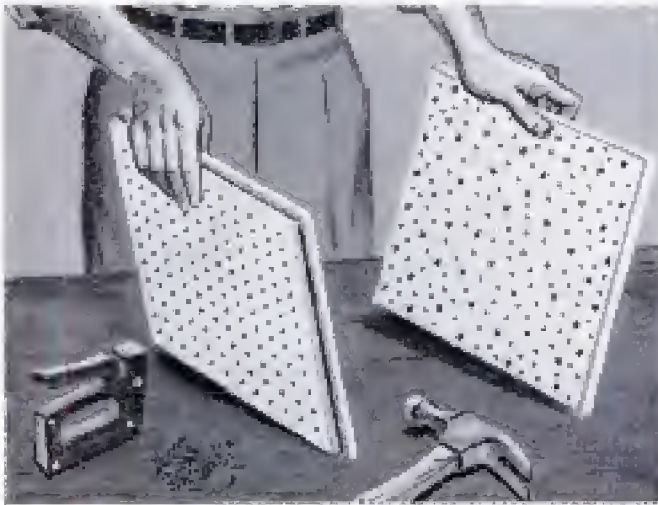
## Junked Refrigerator Unit Provides Compressed Air

Compressed air is supplied in one farm-machinery shed by a compressor unit salvaged from a junked commercial refrigerator. (This particular model requires that the line on one side be plugged and only the discharge be used.) Mounted high on a wall out of the way, the compressor is connected to a small storage tank fitted with an adjustable safety valve that may be set at any desired pressure. The supply hose from the compressor is long enough to reach all four wheels of any piece of farm machinery or equipment in the shed. The electric motor is protected against an overload by being wired through a fuse that will carry just slightly more current than the starting load of the motor.



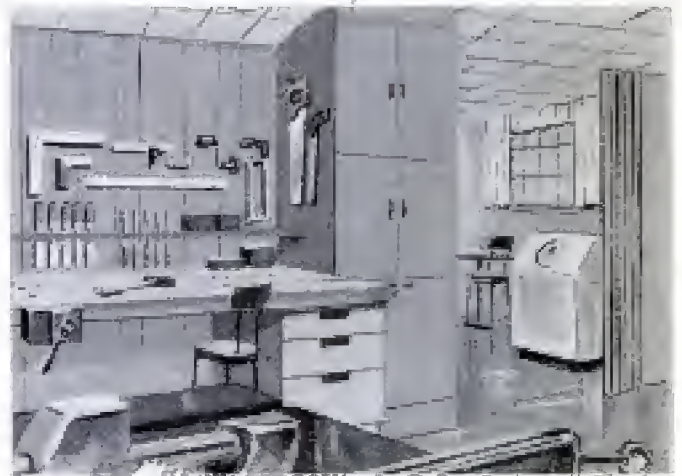
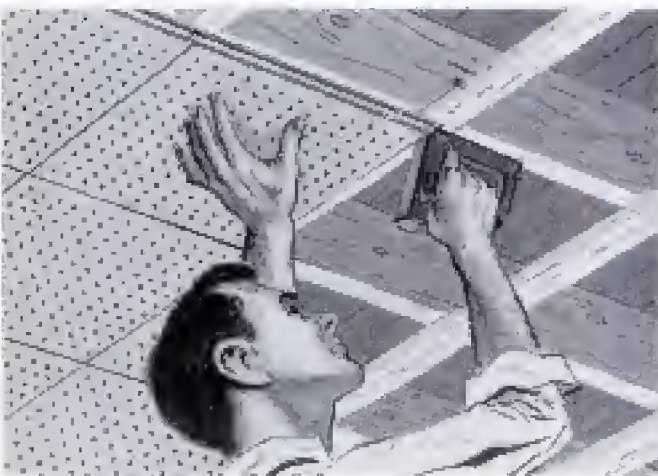
# How to sound condition your basement workroom

Much of the enjoyment and relaxation of working in your basement can be spoiled by disturbing noise. Cut down the annoying effects of power tools, hammering, and sawing by sound conditioning your basement with a ceiling of Armstrong's Cushiontone® or Perforated Temlok Tile. Besides absorbing noise, these tiles provide an attractive ceiling finish you can install yourself.



- 1. Economical wood fiber materials.** Both Cushiontone and Temlok Tile are low in cost, attractive in appearance. They are factory-finished, can be washed or repainted if desired. Cushiontone's noise-trapping holes are arranged in an attractive "Full Random" pattern, while Temlok's perforations are in neat straight rows.

- 2. Installation is easy.** Start by nailing up 1" x 3" seasoned wood furring strips at right angles to the joists on 12" centers. Furring should be shimmed where necessary to provide a level surface for nailing or stapling. If existing ceiling is plaster, gypsum board, or any other smooth, firm surface, Cushiontone can be cemented directly to it.



- 3. A professional-looking job is assured by the special Lok-Bevel joint on Temlok Tile.** Use four 1 1/4" 3d box nails or four staples with 1/2" legs for each tile. With Cushiontone, use flathead or collar nails in shallow-drilled corner holes. Nailheads should be 1/4" or 3/8" wide; nails at least 1/2" longer than thickness of Cushiontone.

- 4. Job's done in a few hours.** You'll have a good-looking, practical ceiling that will solve your basement noise problem permanently. In fact, your family will probably be so pleased with the new-found quiet, they'll want you to sound condition the kitchen, den, and TV room with Armstrong's Cushiontone or Perforated Temlok Tile.

Your building materials dealer will be glad to give you full details on Full Random Cushiontone, Perforated Temlok Tile, and Armstrong's other building materials. For a free booklet on Cushiontone and Temlok acoustical ceilings, write Armstrong Cork Company, 3912 Watch Avenue, Lancaster, Pennsylvania.



## ARMSTRONG'S CUSHIONTONE

Temlok® • M-67® Monowall® • Hardboards • Insulating Wool • Counter-top Cement





Easy-to-use materials for printing pictures—ideally suited for beginners. **Kodacraft Printing Kit**, \$5.25.



Essentials for developing and printing pictures, including roll-film tank. **Kodacraft Photo-Lab Outfit**, \$9.75.



Complete developing, printing equipment including metal printer. **Kodacraft Advanced Photo-Lab**, \$14.95.



For efficient print drying. Capacity—60 average-size prints. Use it over and over. **Kodacraft Blotter Roll**, \$2.88.

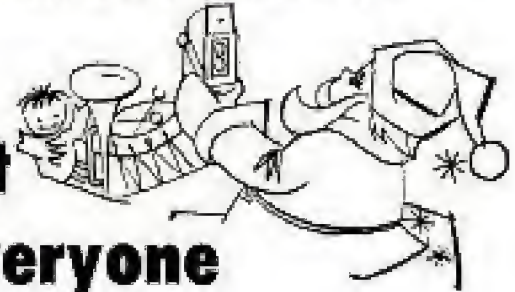


Easy to use. Simple to load in dark. Takes 620, 120, and 127 roll films. **Kodacraft Roll-Film Tank**, \$2.53.



For simultaneous development of two rolls of 828 or 135 film. **Kodacraft Miniature Roll-Film Tank**, \$2.53.

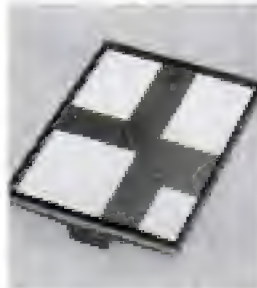
# Shop here for that just-right Kodak gift for everyone



These two pages are a sample of what you can see at your Kodak dealer's. He'll be happy to help you choose the right gift for every name on your Christmas list.



For accurately controlling darkroom solution temperatures. Choice of four **Kodak Thermometers**, from \$.55.



New-type printing frame of steel construction. Includes a set of masks. **Kodacraft Printing Frame**, \$1.65.



Converts tray to efficient, trouble-free washer for prints or films. **Kodak Automatic Tray Siphon**, \$4.50.



3 trays with rockers for uniform developing of average-size prints. **Kodacraft Rocker Tray Set**, \$1.95.



For handling prints in tray; for stirring solutions. Handle top crushes chemicals. **Kodak Stirring Paddle**, \$3.35.



Includes three cups for darkroom work with both papers and films. **Brownie Darkroom Lamp Kit**, \$1.75.



New darkroom safelamp provides direct or indirect illumination—or both. **Kodak 2-Way Safelamp**, \$5.25.



Can be used either from a drop cord or in a wall plug. Includes safelight filter. **Kodak Dark-room Lamp**, \$3.75.



For wall, shelf, bench. Includes switch, cord, safelight filter. **Kodak Adjustable Safelight Lamp**, \$9.75.



Tilting base, minute and split-second hands, large dial. Intervals up to 60 minutes. **Kodak Timer**, \$7.95.



Cool, circline fluorescent lamp, and integrating-sphere lamphouse are prominent features in each enlarger. **Kodak Hobbyist Enlarger** (left), \$57.50, complete with f/6.3 lens. **Kodak Fluralite Enlarger** (right), \$99.50 (lens extra).



**Kodak Enlarging Lenses** range from 50mm, f/4.5 "Ektanon" to 4-inch f/4.5 "Ektar." All superb value, from \$15.



For determining correct printing time—saves both paper and time. **Kodak Projection Print Scale**, \$1.15.



View-type camera with long bellows. **Kodak Fluralite Camera Combination**, \$69.50 (less lens).

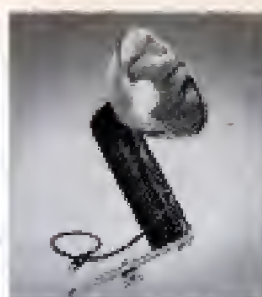




Expertly made Kodak Field Cases make cameras easy to carry, offer sound protection together with smart appearance. Include fine-quality leather cases (left), and durable simulated leather (right). **Kodak Field Cases**, from \$2.65.



Automatically trips shutter, permits photographer to get into picture. **Kodak Auto-Release**, \$3.86.



Provides dependable "flash" for most internally synchronized cameras. **Kodak Standard Flashholder**, \$7.95.



B-C (battery-condenser) flash insures longer battery life, sure "synch." **Kodak B-C Flashholder**, \$9.95.



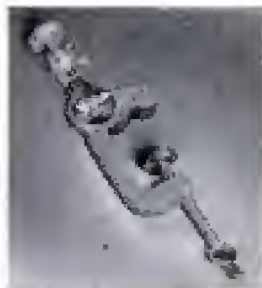
For quick, easy multiple lighting. Lumaclad reflector. **Kodak Flashholder Extension Unit**, Model 1, \$11.



Condenser-type power for dependable "flash." **Kodak B-C Flashpack** (without 22½ volt battery), \$2.95.



Versatile battery-condenser flash system. **Kodak Ektalux Flashholder** (including bracket), \$19.75.



Holds your camera and flash extension unit on most flat or tubular surfaces. **Kodak Flexi-clip**, \$4.75.



For Brownie Hawkeye and Kodak Duaflex III Cameras. Exceptionally easy to attach. **Kodaklite Flashholder**, \$4.



Permits close-range picture taking with most fixed-focus cameras. **Kodak Close-Up Attachment**, \$1.63.



Now, a filter designed for inexpensive box cameras — emphasizes clouds. **Kodak Cloud Filter**, \$1.85.



It's easy to get extreme close-ups with both still and movie cameras with **Kodak Partra Lenses**, from \$2.65.



Shades camera lens and reduces sky flare — attaches to adapter ring. **Kodak Lens Hood**, from \$1.75.



Popular yellow (K2), red (A), and green (X1) filters to fit most cameras. **Kodak Wratten Filters**, from \$1.75.



500-watt lamp; automatic take-up changer; impeller blower. **Kodaslide Signet 300 Projector** (f/3.5 lens), \$72.50.



Vertical slide-feeding mechanism, cool operation, elevating device. **Kodaslide Merit Projector**, \$23.95.



Two superb color slide projectors. **Kodaslide Highlux III Projector** (left), 300-watt; quiet fan; blower, carry case, \$54.75. **Highlux II** (right) gives brilliant 200-watt projection. Converts to Highlux III, \$35.35. Carry Case, \$7.50.



Handiest way to view 2 x 2-inch color slides. Magnifies 4 times. Folds flat. **Kodaslide Pocket Viewer**, \$1.95.



Compact storage for 200 Kodak Ready-Mounts, 66 glass slides. **Kodaslide Ready-File**, \$1.95.



Holds 240 cardboard or 96 glass slides. **Kodaslide Compartment File**, \$3.94.



Holds 360 2 x 2-inch or 180 stereo slides. **Kodaslide Flexo File**, \$4.95.



Materials for mounting 50 color transparencies in glass. **Kodak Slide Kit**, \$3.63.

Prices include Federal Tax where applicable and are subject to change without notice.

Many Kodak dealers offer convenient terms

# Care and Feeding of Engines



BY  
S. P. CORP

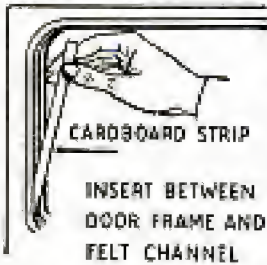
## CHECKING SHOCK ABSORBERS

If your car has gone over 25,000 miles, it's a good idea to check the shock absorbers—not just for comfort, but because non-operative shocks can cause hard steering on curves, and wandering. Stand on bumper, bounce vigorously up and down, then step off quickly. If car continues to bounce, replace your shock absorbers. If it comes to rest on the first bounce, they are O.K. If inspection on a hoist shows much oil on the shocks, your seals are leaking fluid, and shocks should be replaced. Also check to be sure each shock is tight on its rubber bushings, otherwise you will have an annoying rattle.



## DOOR GLASS TROUBLE

If window or door glass drops by itself, note whether handle is up or down when closed. It should be straight down. If up, weight of handle with vibration



CARDBOARD STRIP  
INSERT BETWEEN  
DOOR FRAME AND  
FELT CHANNEL

will tend to pull it down, lowering glass. To correct, remove handle by pressing trim plate inward and disengaging small pin with icepick, or removing horseshoe clip. Replace handle in proper position, installing pin or clip before releasing pressure on trim plate. If glass rattles, lower it, remove molding screws and take off molding. Slip thin pieces of

waterproof cardboard behind glass run channel on hinge side of door. Before replacing molding, run glass up to be sure there is enough tension to keep it from rattling.

## YOURS FOR THE ASKING

You'll find a wealth of helpful car-care information in the free illustrated manual, "MORE POWER, Less Gas, Less Oil." It's yours for the asking. Just address a card to Sealed Power, Dept. G-12, Muskegon, Mich. And when you re-ring, be sure to use Sealed Power KromeX Ring Sets—with chrome-faced top compression ring and chrome-faced side rails on the steel oil ring. You'll get more than double normal ring mileage! There's nothing like chrome for fighting heat, friction, abrasion and corrosion—and there's no other ring set equal to KromeX!



# Sealed Power

## PISTON RINGS

# Clinic for Homemakers



As a service to our readers in solving the hundreds of problems pertaining to a home—inside or out—the editors of Popular Mechanics invite you to present your problems to The Clinic Editor for help and advice. Address your questions to The Clinic Editor, Popular Mechanics Magazine, 200 East Ontario Street, Chicago 11, Ill.

## Concrete Over Brick



Q—My basement is floored with bricks laid loosely and although it is in fair condition and reasonably level, I would prefer to have a concrete floor over the whole area, which is approximately 24 x 36 ft. There is some seepage through the present floor in the spring and fall. I'm told not to lay concrete over the bricks. How about this, can it be done or not?

—M.O., Mich.

A—Of course, it can be done, but we would hesitate to recommend the procedure. The principal reason being the possibility that the bricks might slowly disintegrate after a time in a manner similar to cinders. This would be due to constant absorption of moisture. The end result would be cracks in the concrete floor due to lack of adequate support. If we can judge from your description, local drainage conditions must be better than average or you would experience more trouble from water seepage. Assuming that the basement walls and footings are in good condition, we believe it would be best to remove the brick floor, put in a gravel fill to a depth of at least 6 in. (tamped), then lay a waterproof membrane over grout and finish with at least 3 in. of concrete. The new floor can be poured against a 3/4-in. oiled spacer board at the wall. After the concrete has set, the spacer board is removed and the opening filled with hot tar, poured flush with the surface of the floor. This will form an effective seal against water seepage.

## Dry-Well Drainage

Q—I have just moved into a new home and am trying to decide whether to use splash pads to carry away water from the gutter downspouts or drain these into dry wells. I'm advised against the latter, although they would make by far the neater installation. What is your opinion? Why shouldn't I choose the dry-well method of drainage?—L.B., Ky.



A—We would be inclined to agree with your advisers, although the dry wells might prove satisfactory where natural drainage conditions are such

(Continued to page 226)

THE GREATEST INVENTION SINCE THE HAND SAW . . .

# New **AMF** DeWalt "Power Shop" brings out the expert in you!

Today, AMF DeWalt® "Power Shop" is everywhere known and accepted as the one really safe, accurate, easy-to-use machine. It's so designed that even the inexperienced can *expertly* do everything in home woodworking.

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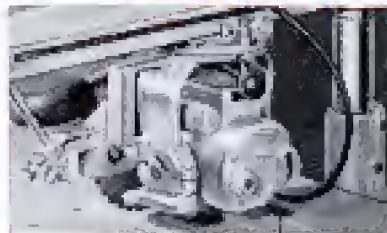


\$229 delivered (saw blade and custom-built 1/2 H. P. motor included). **EASY TERMS.**

## All these exclusive extra-value advantages!



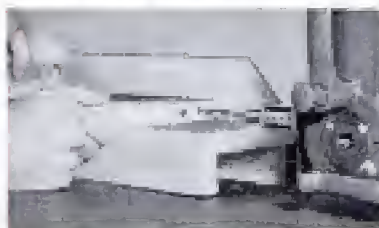
**TOP-SIDE CUTTING!** No guesswork—no mistakes. You always see the cut because layout marks are visible and easy to follow.



**PROFESSIONAL ACCURACY!** Calibrated scales for miter, bevel and rip are visible above table. Instantaneous settings!



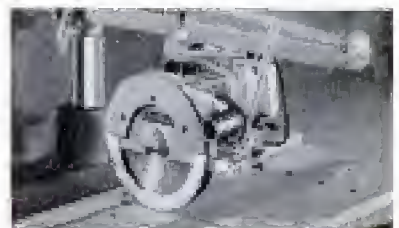
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**HOME SAFETY FEATURES!** "Stop" red controls, UL\*-approved motor, safety key switch, auto-float safety guard (optional).

\*Underwriters' Laboratories, Inc.



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# HOW TO FINISH OFF YOUR ATTIC



This free book makes it easy...

You can turn wasted attic space into beautiful extra rooms in a jiffy! These pages of step-by-step, easy-to-follow instructions tell you how to floor, frame, trim and paint. And how to insure comfort with efficient, sanitary, permanent Fiberglas\* Insulation! Write for your copy and get started—now!



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CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_

\*Fiberglas is the trade-mark (Reg. U. S. Pat. Off.) of Owens-Corning Fiberglas Corporation.

(Continued from page 224)

that all surface water is drained away to a considerable depth in a short time. Dry wells are most effective in loose, porous soils and in sandy soils where there is sufficient slope to carry away sub-surface water. One serious fault of the dry well is its tendency to fill with sand and spill particles and also surface debris if it is not properly covered. In some cases builders offset this tendency by burying a large drain tile, 24 to 36 in. in dia., with the bell end up. This is filled with coarse gravel and a small quantity of sand and protected with a cast-concrete cover which fits into the offset at the bell end. There also are metal seep wells available which are said to be quite effective for the purpose. However, if the soil in the area is a heavy clay or loam having comparatively poor drainage characteristics, then we would recommend that you consider the installation of splash pads.



## Reducing Humidity

**Q**—My home is one-story, ranch type with a crawl space under the floors. There are vents in the concrete foundations. In summer there is considerable moisture on the ceilings and walls. In cold weather, frost has formed on the north wall of an unheated room. This condition has damaged the paint and paper. Is there any remedy?

—J.L., Wis.

**A**—We assume that the floors are of wood with wooden joists. Moisture rising from the grade under the floors will penetrate these materials into the rooms above and very likely is causing at least a part of the trouble you are experiencing. However, there are other sources of excess water vapor in the rooms, such as cooking, laundering and bathing, shower-bathing especially. During the winter months, the moisture content of the air in the rooms may rise to a very high level. You can reduce this to some extent by ventilating the entire house at regular intervals. The installation of a kitchen ventilating fan often proves a definite help. Also, we think it would be advisable to cover the area under the floors with smooth roll roofing laid with 4-in. tarred laps. Weight the roofing with a thin layer of sand, especially at the edges where it meets the foundation wall. It may also be advisable to increase the total free area of the vents in the foundation wall.

## Repairing Porcelain

**Q**—I want to repair a wall-type apron sink so that I can use it in a basement apartment. The porcelain is chipped on the bottom near the outlet and also near the top of the apron in a couple of places. None of the chipped areas is large, but they are unsightly. I understand that there are porcelain-repair materials available which can be applied without heating or any other special preparation of the surface. Are these reliable for the purpose?—C.T., Wash.

**A**—Of course, it is not possible or practical to produce a repair having the durability and smoothness of the original finish. However, the preparations available for this purpose are said to be quite effective. These generally are liquids, heavily pigmented, that dry and harden on exposure to the air, in a manner similar to enamels. If the chipped areas are large, 2 sq. in. or more in area, then we are doubtful about the advisability of attempting a repair. Smaller areas can be repaired with a fair degree of success. When using any of the preparations referred to, it's important to follow the manufacturer's instructions in all details. Usually these will direct you to make sure that the chipped area is thoroughly clean. This usually requires a careful scrubbing to remove any soapy deposit embedded in the tiny crevices. Also, instructions usually direct that you apply the preparation in successive layers. In some cases, it is advisable to build up the repair material to a height slightly above the surrounding surface. After drying it is leveled by sanding with very fine sandpaper, 6/0 or finer.

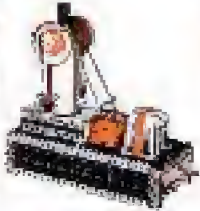
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Put together these gleaming STEEL precision parts and create hundreds of toys! Illustrated "How to Make 'Em" book in every set. But you can do your own inventing! Models whistle, "choo-choo," light up and puff smoke. Tell Dad you want ERECTOR and see displays at stores. For *free* ERECTOR and Gilbert Toy Book write Gilbert Hall of Science, 207 Erector Square, New Haven 6, Connecticut.



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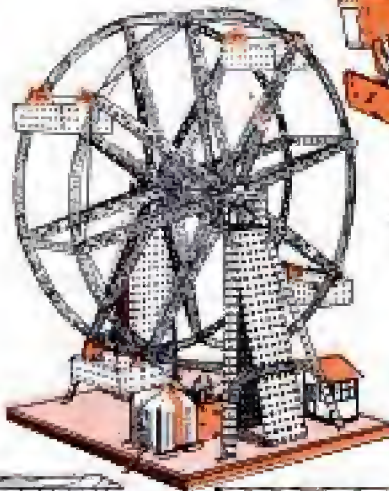


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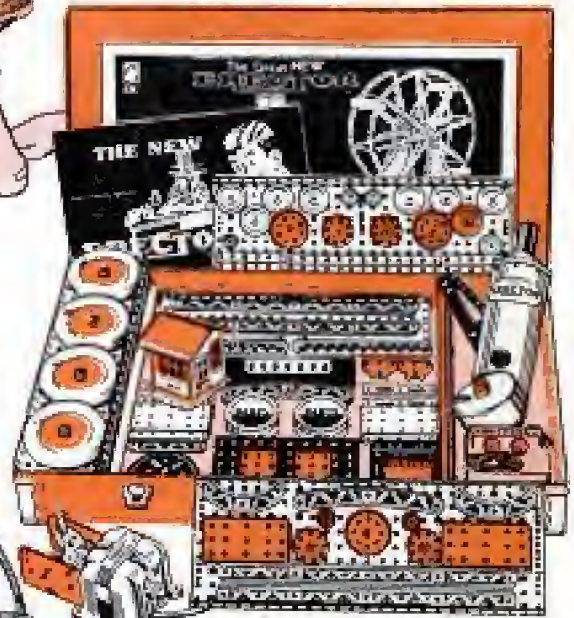


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Huge ferris wheel turns fast or slow; reverses. Made with ERECTOR No. 8½.

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WITH ERECTOR!

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only  $2\frac{15}{16}$ " high...  
fits under tight places

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**SANDERS**

816 Packer Street  
Easton, Pa.

AVAILABLE AT HARDWARE STORES

## Model Railroad With Sound Effects

(Continued from page 116)

One fascinating train is a complete 15-car Sells-Floto circus train built by Elbert Swerdfeger, son of M. D. Swerdfeger. The passenger, baggage and flatcars of the train are precise copies, painted to match the originals and loaded with the same equipment carried by the full-sized cars. The model of the tent car, for instance, carries the stakes and canvas of a tiny circus tent that actually can be unrolled and erected. A typical flatcar is loaded with a water truck complete with barrels, an animal cage with a hippo inside and a gaudily painted band wagon.

The scaled-down circus cars are supreme examples of the modelmaking art. Other examples are some of the boxcars that carry advertising on their sides in the best railroad tradition. The sign on one boxcar reads "Eat Swerdfeger's Buttercup Brand Pickles" while another advertises "Scott County Canned Foods." In coloring, arrangement and style of printing the little signs are exactly like those often seen on freight cars.

Many model railroaders build locomotives and trains of convincing realism and then destroy the whole illusion by using background scenery so crude that it seems to have been assembled from a toy store. Chet Tayloe carries his realism all the way into the background and even humanizes the layout here and there with traces of humor.

On a circus poster pasted to the side of a tiny shed, for example, you'll find a penciled cartoon apparently scrawled there by an idle boy. Down near one of the railroad cuts the modelmaker is building a typical hobo "jungle" with tiny figures crouched around a campfire that consists of a miniature glow lamp, wired from below.

Not content with the church that he placed on a hill, he built a graveyard beside it and then, as a final touch, removed a section of the imitation turf to provide a freshly dug grave. Now some of his friends complain that the freshly dug earth, being moist, should be slightly darker than the rest of the dirt!

Tayloe builds his mountain backgrounds of plaster and burlap that is draped over rough board forms while the plaster is still wet. Then it is shaped into the exact shapes desired. An imposing cliff was created by making a plaster mold of the flat face of a big slab of coal, then using burlap and colored plaster to make a cast for use as the cliff. This plaster copy retains all the indentations and cleavage lines of the

(Continued to page 230)

# The CHRISTMAS GIFT

that has everything any  
homecraftsman or  
hobbyist needs

FOR SCORES OF  
MONEY-SAVING  
JOBS

Perfect gift to give or receive . . .  
useful all year 'round. Each kit includes:

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250 watts
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soldering
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and sealing
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Nothing else to buy for soldering, sealing, cutting, mending,  
joining and smoothing. Makes professional results easy.

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No other soldering gun or iron offers the  
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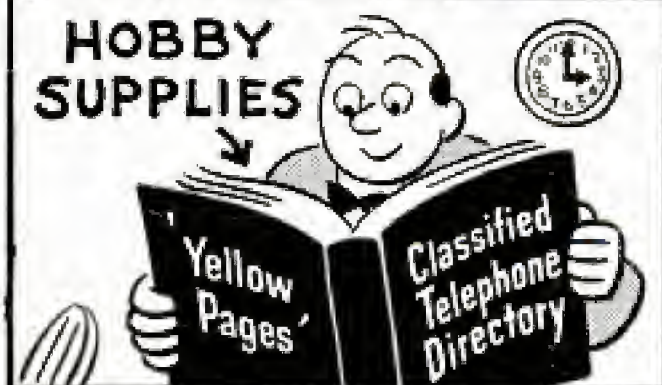
MODEL 8250AK



# Looking for Something?



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original and now has the appearance of an imposing granite wall.

Fibrous insulation board, split and torn to various shapes, makes a good imitation of uneven ground and so this is used for most of the foregrounds in the layout. Shrubbery trimmed to shape and dipped in paint becomes realistic trees. Small pine cones sprayed a dull green and placed on their bases side by side will represent a distant fir forest on one mountaintop that is not yet finished.

Backgrounds and foregrounds are painted by hand or by spray, using water paints to avoid a shine, and mostly in dull reds, browns and grays that imitate the colors of nature.

Waves on the model ocean at one end of the layout are created by bending wire screen to the shape of the combers, then coating the screen with a surface of casting plaster. The waves are painted green with flecks of white for foam. The placid surface of a lake is imitated by a flat sheet of cardboard, water-colored to give the varying hues of blue-green desired, then varnished for the sparkling effect of water. The edges of the lake are simply filled in with loose sand. Aquarium sand mixed with varnish and shaped by hand with a straightedge makes a strong, realistic roadbed for the railroad trackage.

The principal construction materials for the model buildings are Bristol board, paper and thin sheets of soft pine. To get the effect of shingles, Tayloe overlaps thin strips of paper, glued in place. The columns of a grain elevator came from cardboard mailing tubes. Painted in imitation of concrete and boxed at the top, they look like the real thing.

All the buildings in the layout are realistic and yet one is outstandingly so. This is a shed labeled "Captain Billy's Boat Yard" that stands on pilings overlooking a lake. Created by E. S. Hammack, it has the atmosphere as well as the appearance of a dilapidated boathouse. There is a sea gull resting on the roof, tiny Coca Cola and Dr. Pepper signs plastered on its walls, and even a case of soft-drink bottles tipped against a wall. On one side of the boathouse a rowboat is under construction, as evidenced by the scaled-down sawdust and wood chips lying beneath it.

Complete as it appears to be, the model-railroad layout is far from finished. Still to be added are the sawmill and its pond, a waterfall and river along which real water will flow, a mine in the mountains with ore cars on mine trackage, and numerous industrial buildings. Tayloe and his friends are working on these parts of the layout now. ★ ★ ★



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When the average battery is run down due to frequent starting in city driving, balky starting in sub-freezing weather, heavy use of lights, heater, radio or other accessories, faulty voltage regulation, or because a car has been idle too long—START-O-MAGIC will recharge it overnight, and keep it fully charged until needed.

START-O-MAGIC is made by Franklin, the company that has been manufacturing battery chargers for the nation's leading battery makers and the automotive industry for over 25 years.

Send for your START-O-MAGIC today . . . and enjoy trouble-free starting throughout the year.



As reported by Popular Mechanics  
in November, 1954 issue. Page 111

### Only **START-O-MAGIC** has all these features

- Plugs instantly into lighter socket on dashboard.
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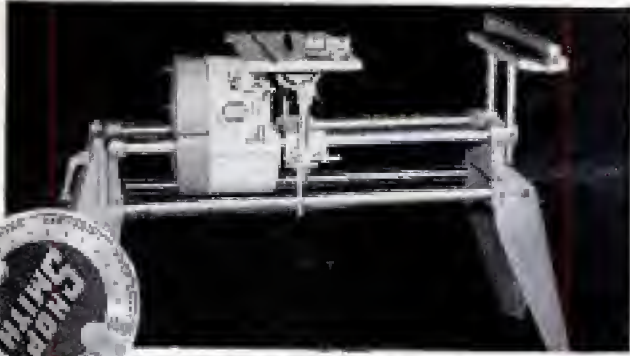


Find the right speed for any job and you're on the way to safer, more accurate work. Now SHOPSMITH with Speed-Dial makes it easy to find the exact speed... makes accurate work possible for everyone.

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want—Saw, Jointer, Jigsaw, Dadoing, Sanding, etc. No bothersome belts and pulleys to change. No more "next best" speeds to spoil your craftsmanship. An infinitely variable selection of speeds from 700 to 5200 rpm.

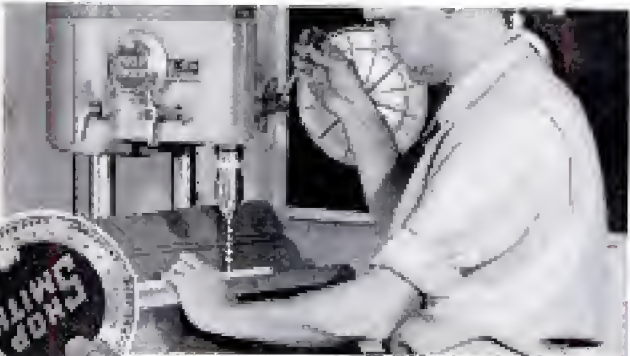
\*T.M. Reg. U. S. and Foreign Countries



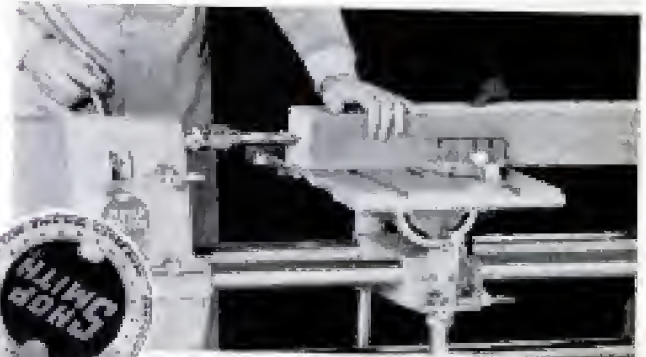
**For sawing**—Cross-cutting, ripping, doing, molding . . . each has a separate Speed-Dial setting. Powerful 7" circular saw cuts 2" lumber even at 45° angle. Adjustable extension table supports work up to 48" from blade. Quick-change saw arbors for easy blade switches.



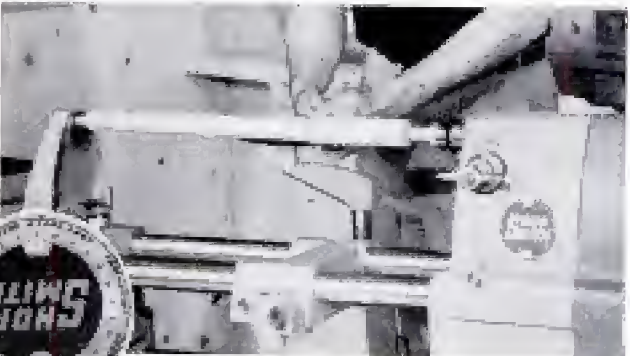
**For sanding**—Individual Speed-Dial settings for coarse, medium and fine sanding of plastics, metal or wood. Big 12" disc has 113 sq. in. of sanding surface. Disc feeds into work. Depth control dial and built-in jigs assure precise duplication of work without repeated measurements.



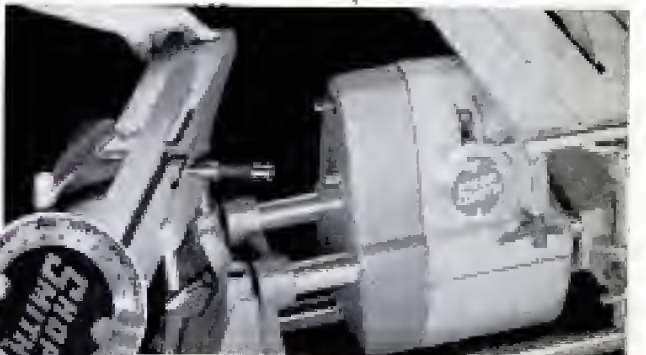
**For drilling**—Different Speed-Dial settings to cover a complete range of drilling wood, metal, plastics. Vertical Drill Press drills to center of 1 1/2" circle, handles floor drill press operations with up to 58" between chuck and floor . . . has depth control dial and ready-made jigs.



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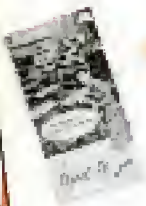


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## That Wonderful Volcanic Popcorn

(Continued from page 139)

Once in the house, you find that the outstanding insulating properties of perlite cut your heating bills substantially.

If a guest drops a carelessly snuffed cigarette into the wastebasket, perlite walls will keep the fire from spreading through the house. In Underwriters' tests, flames licked at one side of a perlite-concrete wall for four hours before the average temperature on the unexposed side reached a moderate 132 degrees Fahrenheit.

There are still drawbacks to the use of lightweight aggregates. They are about 10 percent more expensive than sand, and must be applied in a slightly different way. But processors are sure they can slash the price as new furnaces and better handling methods come into use.

As perlite becomes cheaper, sand becomes more dear. The "sharp" sand suitable for plaster and concrete is getting more expensive every year as deposits near large cities are exhausted.

Some of perlite's special characteristics help cut home-building costs. It can be blown or poured into walls and between the joists of attic floors where it does a first-rate job of insulation. When used in this way, it doesn't absorb moisture and doesn't settle. Because it is inorganic, it is insect and rodent proof and does not decay.

New refrigerators lined with perlite are space savers. Because its walls don't have to be thick, a 10-cubic-foot refrigerator with perlite insulation takes no more space than a seven-cubic-foot conventional box. There is extra room for vegetable storage.

Cold-storage warehouses and icehouses built of perlite are under way. Perlite is used to line refrigerated railway cars and ships. Space saved by this remarkable insulation means lower shipping costs and a reduction in fruit and meat prices.

Radio stations are using perlite as sound-proofing. It is being employed as a flattening element and extender for rubber-base paints. It makes an excellent refractor, an abrasive, or a packing material replacing fibers. It is an ingredient in soaps and fertilizers. Drillers pump perlite-gypsum plaster as a sealer into oil wells. The bilges of ships are filled with it to prevent excessive collection of water with its foul odors and dangerous oil slicks. Automotive and air-conditioning filters made of perlite are very efficient.

Hundreds of other uses for the miracle mineral are expected. Since the day perlite first popped like popcorn before the amazed eyes of Lee Boyer, industry has found it to be a material of real importance. ★ ★ ★



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**Mighty useful.** There's power to spare for hundreds of jobs with this rugged new Millers Falls 1/4" Drill. No. 1814 Drill alone, \$22.35. In complete, accessory-packed Deluxe Drill Kit No. 8142, \$42.25. Other Millers Falls drills from \$19.85 — kits from \$29.95.

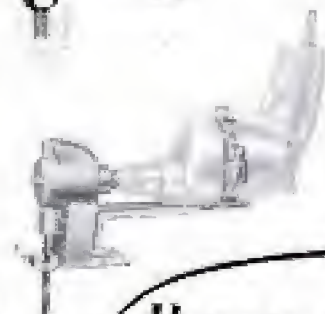


**Fits any 1/4" electric drill.** For work in corners, between studs, and other hard-to-get-at places. No. 2130 Universal Right-Angle Drive \$4.95

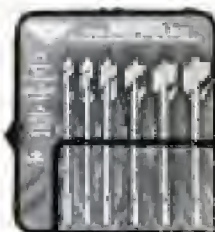


**Sand and polish** with any 1/4" electric drill. Complete with 5" rubber pad, 5" lambswool bonnet, two 5" sanding discs. No. 2120 Universal Buffing and Sanding Attachment, \$8.45.

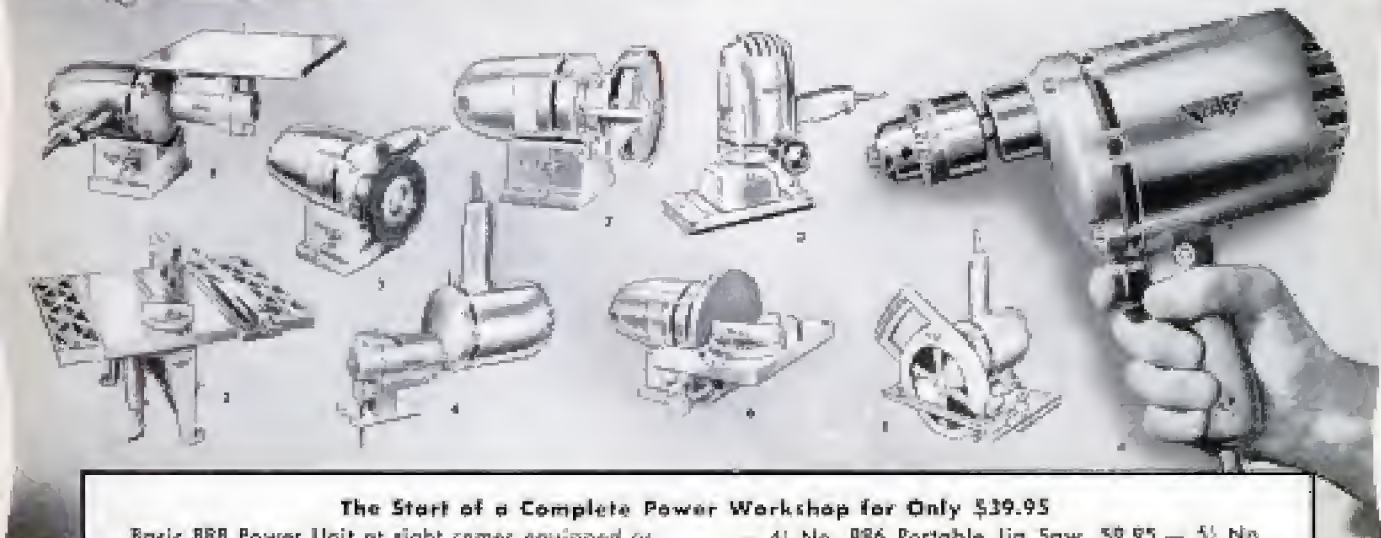
**Universal Jig Saw Attachment.** Converts any 1/4" electric drill into an efficient saw that cuts straight or curves. Capacity 3/8" in wood, 5/8" in metal. Needs no starting hole in wood — cuts own way through. Complete with 4 saw blades. No. 2140, \$10.95.



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— 4) No. 886 Portable Jig Saw, \$9.95 — 5) No. 881 Bench Stand, \$2.95 — 6) No. 889 6" Disc Bench Sander (also requires No. 881 Stand), \$7.95 — 7) No. 8810 4" Bench Grinder (also requires No. 881 Stand), \$5.95 — 8) No. 887 Jig Saw Table (converts No. 886 to Bench Saw), \$1.75. Special Bulletin at your hardware store or on request.

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## Children's Playroom Phono Has Grown-Up Features

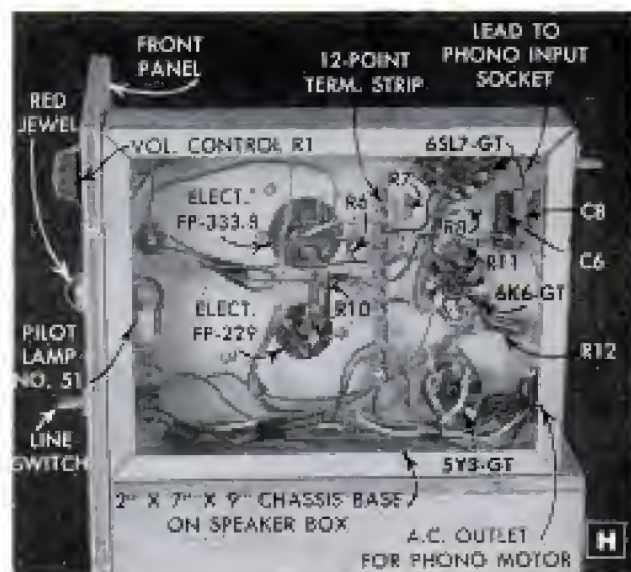
(Continued from page 163)

transformer specified, the negative feedback resistor R6 value is correct, and gives 24 db feedback. The speakers must be correctly phased; that is, the cones must go in and out together. To check them, connect them in series with a 1½-volt dry cell. If one goes in and the other goes out, interchange the two leads to just one.

### CABINET BILL OF MATERIALS

Item	Qty.	Name	Size Inches
1	1	Left side	3½ x 14½ x 30½
2	1	Right side	3½ x 14½ x 30½
3	1	Top	3½ x 13½ x 10½
4	1	Motor board	3½ x 13½ x 10½
5	1	Brace	3½ x 3½ x 11½
6	1	Top back	3½ x 3-7/16 x 13
7	2	Motor board backstop	3½ x 3½ x 3½
8	1	7-in. album back	3½ x 1-11/16 x 7-9/16
9	1	7-in. album side	3½ x 8 x 7-9/16
10	1	Amp. and Spkr. shelf	3½ x 13½ x 10½
11	1	Bottom	3½ x 13 x 10½
12	1	10-in. record rack	3½ x 13 x 1-15/16
13	1	Amp. Spkr. panel	3½ x 7-9/16 x 10½
14	2	Spkr.-box top and bottom	3½ x 9½ x 3-7/16
15	2	Spkr. boards	3½ x 6¼ x 5
16	1	Spkr.-box rear	3½ x 6¼ x 3-7/16
17	1	Spkr.-box side	3½ x 9½ x 7
18	1	Piece grille cloth	7 x 8
19	1	Piece glass fiber	3½ x 6¼ x 13
20	2	Jensen type 4J4, 4" PM speakers	

All cabinet-construction details appear in Fig. 1, and the key numbers refer to the corresponding numbers of the items in the cabinet bill of materials. Use glue and No. 18 headless brads, ¾ in. long. The template for the cutout in the motor board comes with the 3-speed phono motor which is a type SS General Industries unit. The pickup is a turnover crystal type Model 7D As-tatic. The Jensen type 4J4, 4-in. PM speakers are about \$2.11 each. Detailed student material list R-429 is available from Popular Mechanics Radio-TV and Electronics department upon receipt of ordinary letter postage. ★ ★ ★





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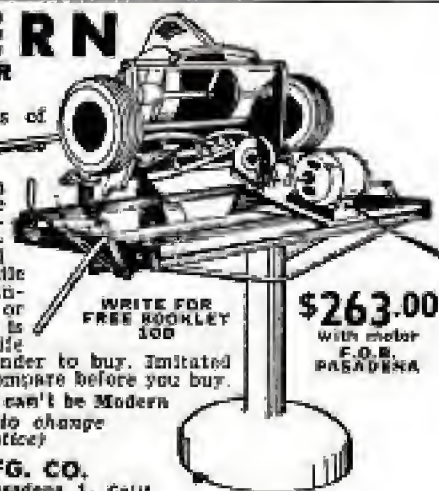
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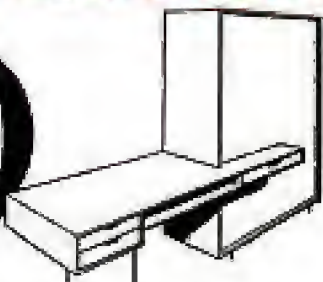
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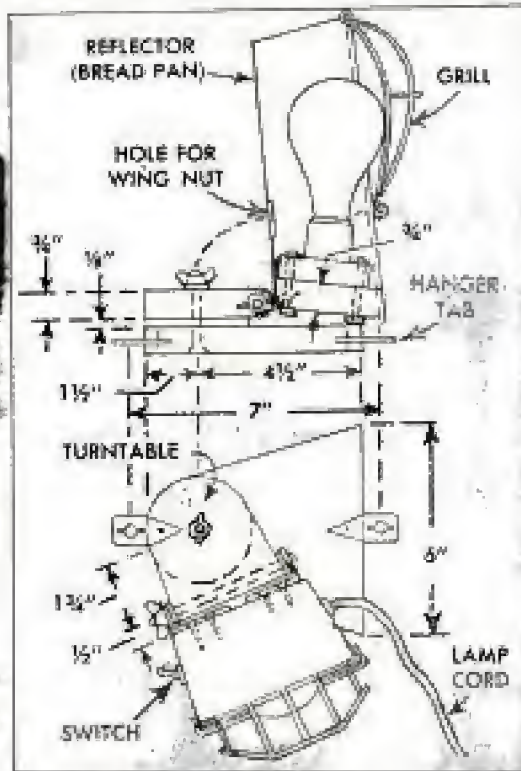
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en block, then both block and receptacle are bolted to the bottom of the inside of the reflector. Flat-steel angle brackets, screwed to the back of the reflector and into the block, pivot on a bolt inserted through a hole drilled through the front edge of the upper leaf of the turntable. Leaves of the turntable rotate on a 1/8-in. hardboard disk, 3 in. in dia., and are assembled with a bolt and wing nut. A hole cut in the back of the reflector permits it to be folded flat against the turntable without interference from the wing nut. Slotted hanger tabs on the opposite end of the lower leaf permit hanging the light.

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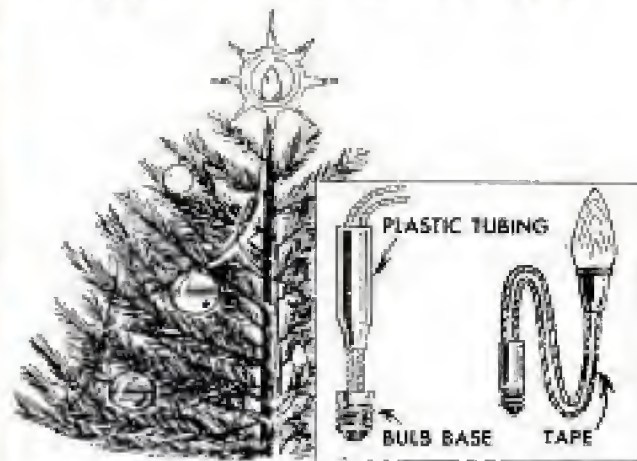
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## Extension Aids in Arrangement Of Upper Christmas-Tree Lights



The problem of arranging strings of lights on a Christmas tree so that one of the bulbs can be positioned to illuminate a treetop ornament can be eliminated if this lightweight extension cord is used. The extension is made by removing the glass and cement from the base of a discarded bulb and soldering two wires to the inside. One wire goes to the shell, the other to the contact point. A length of plastic tubing—the tapered barrel of a fountain pen is excellent—is cemented to the base and taped to the wires. The wires now are cut to the desired length, and a bulb socket with its wires is taken from a spare string of lights and spliced to the ends of the extension wires. In use, the extension is screwed into the closest socket of the string of lights nearest the top, in place of the bulb.—Lance Werner, Cleveland, Ohio.

## Eraser Props Photo Thermometer



Drilling a rectangular pencil eraser and pressing it over a stirring-rod type of dark-room thermometer provides a prop to hold the thermometer at an angle in the bottom of the tray. This not only makes the thermometer easier to remove from the tray, but also keeps it from rolling. In this way, the indexed side of the thermometer can be held in the upward position so that the temperature may be read at a glance, and breakage held to a minimum.—H. Klein, Philadelphia, Pa.

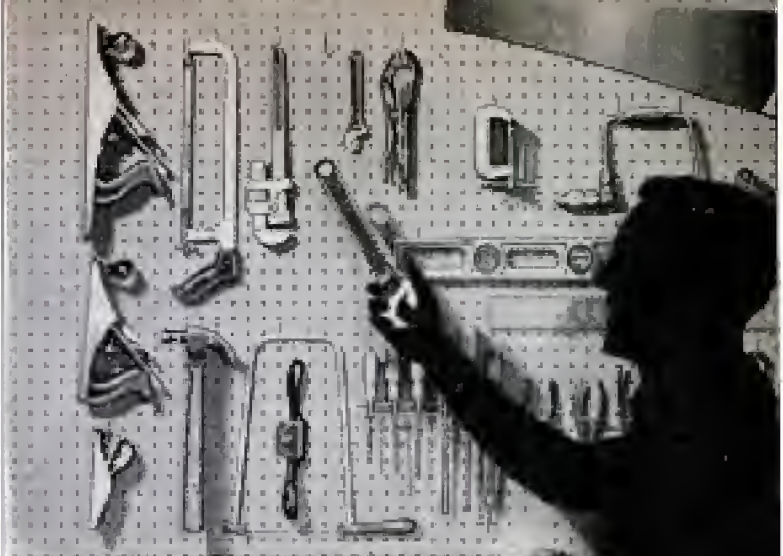
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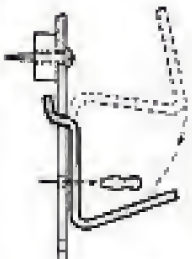
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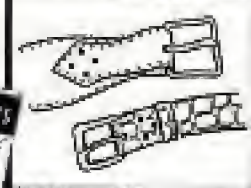
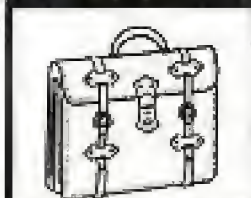
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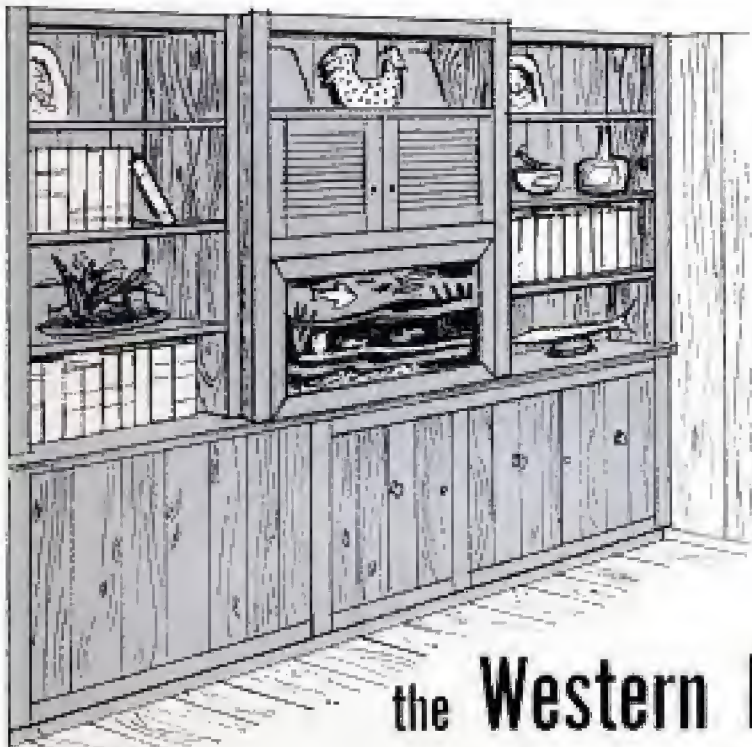
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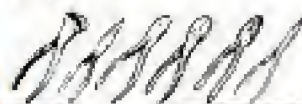
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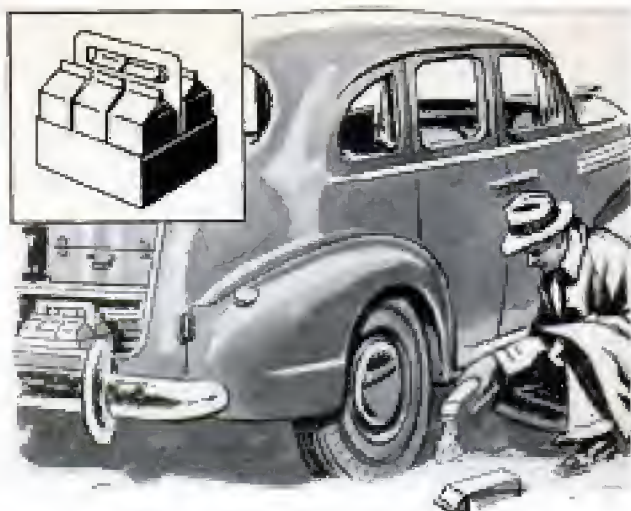
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### Sand Carried in Milk Cartons Provides Winter Driving Aid

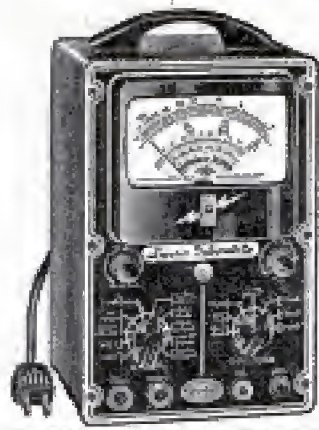
Although a supply of dry sand is an invaluable cold-weather driving aid, storing and handling the gritty substance in a car presents a problem. This can be overcome by using quart-size waxed milk containers, six of which can be fitted in a cardboard "carry home" carton such as is used for soft drinks, and carried neatly and securely in the trunk of the car. The quart-size container is easily handled to apply sand to the rear wheels as required. Be sure that the milk containers and sand are dry before filling the containers.—R. M. Woodbury, Natick, Mass.

### Rust Specks Removed From Prints With Oxalic Solution

Brown specks on photo prints, caused by particles of rust in the wash water, can be removed with a solution of oxalic acid. Oxalic-acid crystals, 30 grains, are mixed with water, one ounce, and the resulting solution is applied to the rust specks with a pointed toothpick or clean penpoint. Blot the speck immediately and the stain will completely disappear from the print.

O. A. Nelson, Seattle, Wash.





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Model 670-A

# SUPER-METER

A COMBINATION VOLT-OHM MILLIAMMETER PLUS  
CAPACITY REACTANCE INDUCTANCE AND DECIBEL MEASUREMENTS

**SPECIFICATIONS:**

D. C. VOLTS: 0 to 7.5/15/75/150/750/1,500/7,500  
Volts. A. C. VOLTS: 0 to 15/30/150/300/1,500/3,000  
Volts. OUTPUT VOLTS: 0 to 15/30/150/300/1,500/  
3,000 Volts. D. C. CURRENT: 0 to 1.5/15/150 Ma.  
0 to 1.5/15 Amperes. RESISTANCE: 0 to 1,000/  
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to 1 Mfd. 1 to 50 Mfd. (Good-Bad scale for check-  
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**ADDED FEATURE:**

Built-in ISOLATION TRANSFORMER re-  
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through misuse.

The Model 670-A comes  
housed in a rugged  
crackle-finish steel cabi-  
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leads and operating in-  
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**\$28<sup>40</sup>**



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Model TV-11

# TUBE TESTER

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- Because all elements are numbered according to pin-number in the RMA base numbering system the user can instantly identify which element is under test. Tubes having tapped filaments and tubes with filaments terminating in more than one pin are truly tested with the Model TV-11 as any of the pins may be placed in the neutral position when necessary.
- The Model TV-11 does not use any combination type sockets. Instead individual sockets are used for each type of tube. Thus it is impos-

sible to damage a tube by inserting it  
in the wrong socket.

- Free-moving built-in roll chart provides complete data for all tubes.
- Phone Jack on front panel for plugging in either phones or external amplifier will detect microphonic tubes or noise due to faulty elements and loose external connections.

Operates on 100-130  
Volt 60 Cycles A. C.  
Hand-rubbed oak cabi-  
net complete with  
portable cover

**\$47<sup>50</sup>**

The New Model TV-40

# C.R.T. TUBE TESTER



A complete picture tube tester  
for little more than the price  
of a "make-shift" adapter!!  
Tests all magnetically deflected  
tubes... in the set... out of  
the set... in the carton!!

Model TV-40 tests picture tubes to  
the only practical way to efficiently  
test such tubes: that is by the use  
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is designed exclusively to test  
the ever increasing number of  
picture tubes!

Tests ALL magnetically  
deflected picture tubes  
from 7 inch to 30 inch

Tests for quality by the  
well established emission  
method. All readings on  
"Good-Bad" scale.

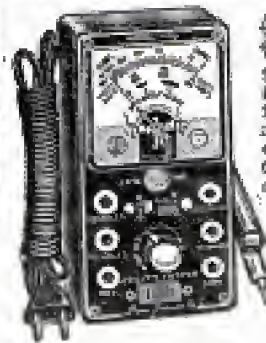
Tests for inter-element  
shorts and leakages up  
to 5 megohms.

Tests for open elements.

**EASY TO USE:** Throw switch up  
for quality test... read direct on  
"Good-Bad" scale. Throw switch  
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Model TV-40 comes absolutely  
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to buy. Housed in round  
cornered, molded bakelite  
case. Only **\$15<sup>85</sup>**

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Model 70: • Measures A.C. and D.C.  
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Model 70 will test: • Both 6 Volt  
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equipment, etc. Only **\$15<sup>85</sup>**

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Try any of the above in-  
struments for 10 days be-  
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Model 670-A, Total Pr. \$28.40  
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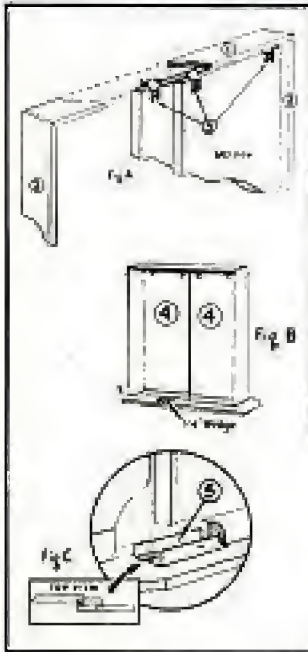
# Wife cramped for closet space?



YOU CAN INSTALL A **NOVOPLY**<sup>®</sup> SLIDING DOOR UNIT IN A FEW HOURS!

### JUST 4 EASY STEPS:

1. Assemble header (1) and jambs (2) in opening. Shim jambs to make frame square.
  2. Place roller carriers (3) in grooves of overhead track in header (1).
  3. Wedge doors to adjust (Fig. B); screw to carrier.
  4. Install door guide clip (5) in floor (Fig. C).
- Stock units range from 6' 9½" to 8' high, from 2' to 8' wide. Make a whole storage wall quickly and without straining the pocketbook. Novoply doors cost less than ordinary doors, never bind, and are *guaranteed* against warping in excess of 1/8".



See your lumber dealer or send for **FREE FOLDER**.

Novoply Sliding Door Units by

## Weldwood<sup>®</sup>



United States Plywood Corporation  
WORLD'S LARGEST PLYWOOD ORGANIZATION

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and U.S.-Mengel Plywoods, Inc., Louisville, Kentucky  
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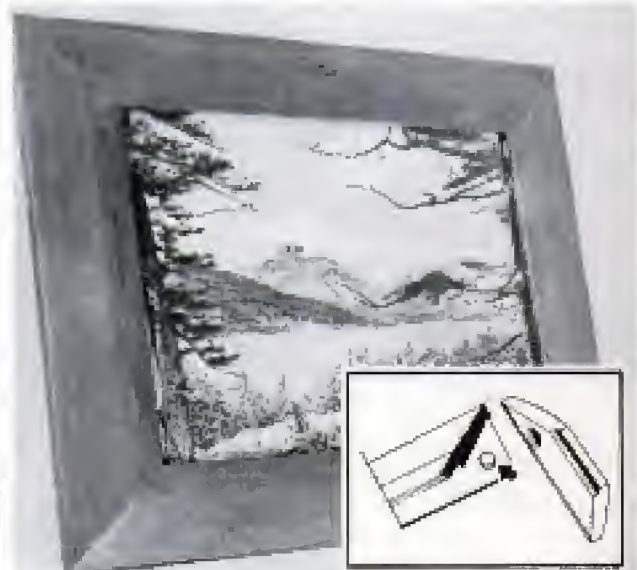


## Plastic Ink-Filled Cartridge Supplies Fountain Pen

Cartridges of liquid ink supply a Waterman fountain pen that eliminates the messy ink bottle. In filling, neither the hands nor the pen tip touch ink. Inserting a fresh cartridge in the barrel takes only 10 seconds and, because each cartridge contains much more ink than a standard pen, fillings are less frequent. The unbreakable plastic cartridges are leakproof enough to be carried in the pocket and transparent so that it is possible to see the amount of ink left in the pen. The pen itself has no siphons or sacs.

## Buttons Secure Picture Frame

Special hardwood buttons on a new type of picture frame force and hold a close fit at mitered corners

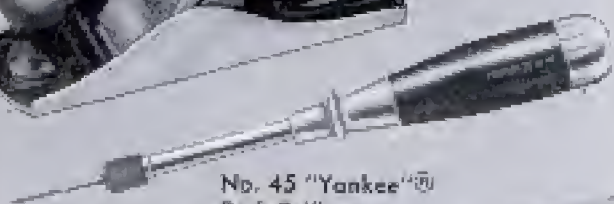




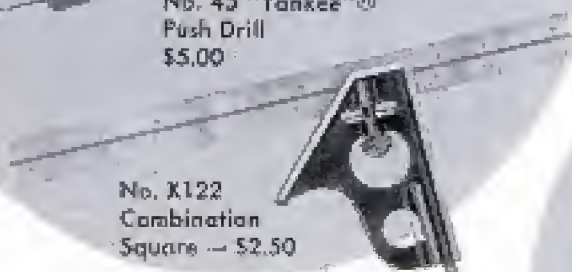
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No. X4  
Bench Plane  
\$8.50



No. 45 "Yankee"  
Push Drill  
\$5.00

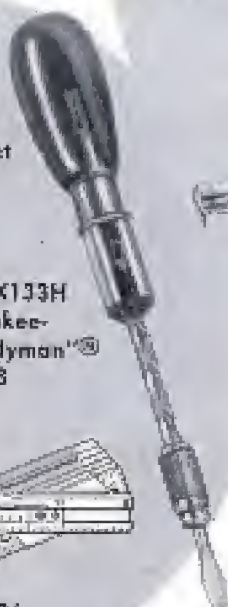


No. X122  
Combination  
Square — \$2.50

Give the average man a Stanley Tool that welcomes him to craftsmanship.



No. X125A  
Power Bit Set  
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No. X133H  
"Yankee-  
Handyman"  
\$2.98



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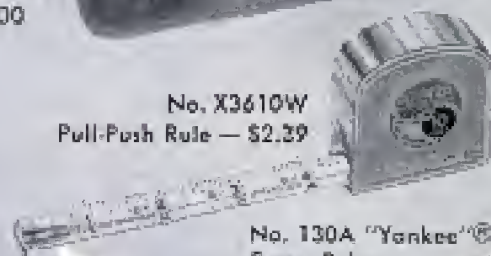
Give your teen-age son a Stanley Tool that makes for best beginnings.

For every man this gift of tools is the finest kind of giving.

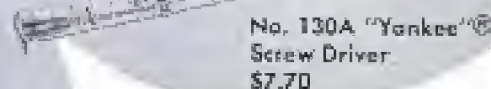
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Pull-Push Rule — \$2.39



No. 130A "Yankee"  
Screw Driver  
\$7.70

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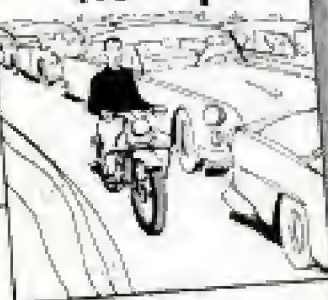
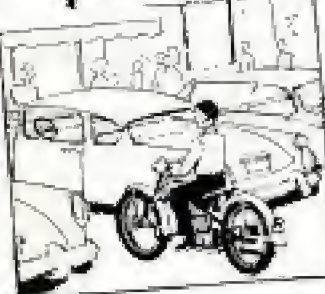
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**No traffic tie-ups!**



**It's SMART to ride a**

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**NO PARKING AREA'S SO CROWDED** that there's no room for this All-American lightweight. Small and compact, the 165 parks in small spaces anywhere.

**NO ROAD'S SO CROWDED** that you can't thread through every traffic jam. This peppy two-wheeler is easy to handle . . . safe and economical, too. Small wonder the Harley-Davidson 165 is called the world's most practical transportation.

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**Miles per Gallon**

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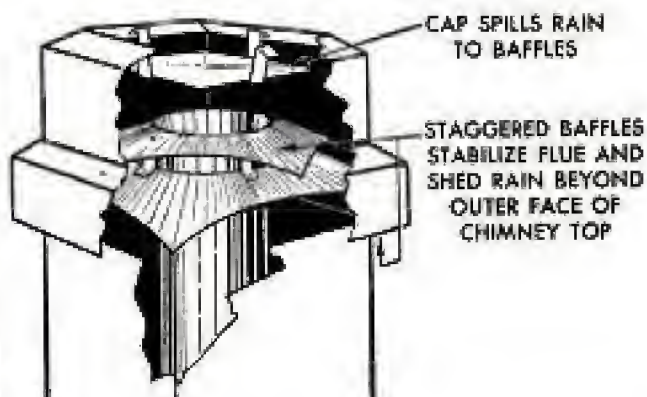


## Power-Driven Hoe Churns Soil

Flower beds and vegetable gardens are easily cultivated with a new power-driven hoe. A two-horsepower gasoline engine is mounted on the top of the hoe and the entire tool is carried on a sling around the gardener's shoulder. The hoe has four steel blades that churn up the soil to a depth regulated by the speed of the operator's movement across the ground. For deep hoeing a 2½-pound weight is fastened to the tool. The hoe also can be used for digging small trenches and stirring litter in poultry houses.

## Smoke Passes But Rain Stops

Complete protection from rain and better dispersal of fumes are the objects of a new top designed for metal chimneys. The staggered baffles that keep water from the flue are so arranged that they do not impede the flow of smoke.



POPULAR MECHANICS

# Give a HOBBY for CHRISTMAS

**DREMEL Moto-Jig Saw is the Basic Workshop Tool... Used by Thousands Who Enjoy an ALL-FAMILY HOBBY**

- The DREMEL is a real production tool with a built-in ROTARY MOTOR. (Do not confuse with "vibrator" type jig saws.)
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- Only DREMEL has Rocker Action that keeps blade under steady tension, lengthens blade life!
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**ONLY \$23.50**

complete with rotary motor

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The DREMEL Moto-Jig Saw is America's outstanding tool value. Use it to make hundreds of valuable projects—lawn furniture, benches, cabinets, decorations, toys, etc! Save money by doing your own home repairs. Enjoy a profitable and fascinating hobby you can share with the entire family! The DREMEL is so superior that you will find it hard to compare it with other jig saws costing many dollars more. You'll agree it's the greatest value in its own history!



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DREMEL MOTO-TOOL is the fastest, most powerful tool in its class—approximately 27,000 R.P.M. It works beautifully in wood, plastics and metal. Unbeatable for home maintenance jobs, model making, a host of money-saving projects. Weighs only 13 oz. Shockproof. 110-120V., A.C.-D.C. motor. Thousands of satisfied users in home and industry.

## KIT NO. 1

Includes Model 1 Moto-Tool and 34 Accessories (steel cutters, grinding wheels, polishers, etc.). Packed in attractive steel case. Complete.

**\$19.50**



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Moto-Tool No. 2 (with 1 emery wheel point) **\$17.85**



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with Gold Bond Gypsum Wallboard



It's easy to transform a cluttered attic into a snug new room like the one below with Gold Bond Gypsum Wallboard. Gives you durable, fireproof walls and ceilings at low cost...takes any decoration, too!



Application is fast...one panel of Gold Bond Gypsum Wallboard covers up to 48 square feet! Can be sawed like lumber or scored with a knife and snapped off to size. Nail it directly to wood framing or, in remodeling, right over the old walls. Use the Gold Bond Tape Joint Kit to make joints disappear quickly and easily. And for a beautiful decorator finish, paint with Gold Bond Velvet...it dries in an hour.

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Write for Gold Bond How-To-Do-It Plan No. 11 with complete instructions for building the room shown above.

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Please send me How-To-Do-It Plan No. 11. Enclosed is 10¢ to cover cost of handling.

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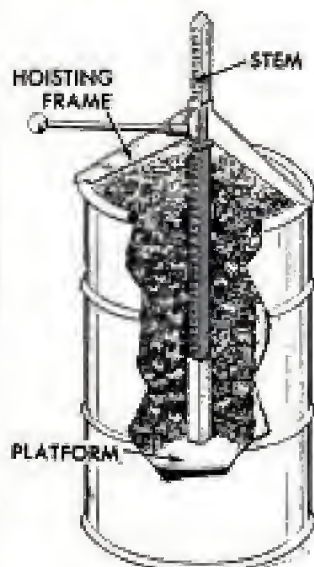


## Bowl Attachment for Hose Mixes Fertilizer With Water

Now you can spread fertilizer with a garden hose. A plastic attachment for the hose contains a mixing chamber that is filled with powdered or granular fertilizer. As water rushes through the chamber, it carries the plant food with it and spreads it evenly on the lawn. About one cup of plant food can be spread every 15 minutes.

## "Elevator" Empties Barrel

Machine operators save time and eliminate waste motion when parts are loaded in a storage drum equipped with an elevating false bottom. The elevator consists of two separate assemblies. First, the platform and stem are placed in the barrel before the parts are loaded. Then, when the barrel is given to the machine operator, he inserts the hoisting frame inside the stem. As he empties the barrel he raises the parts by moving a lever on the hoisting frame. In this way he never has to reach down inside the barrel. The labor-saving device is made to fit a standard 55-gallon drum.

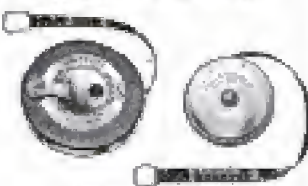




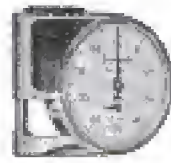




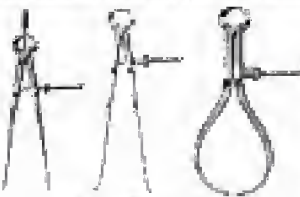


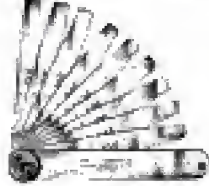


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 <p>No. 236 Depth and Angle Gage</p>	 <p>No. 86A Hand Vice with Clamp</p>	 <p>Nos. 77, 74, 75 4" Dividers and Callipers</p>	 <p>No. 596 Pencil Dividers</p>
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ity Hobart  
welders

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Learn profitable arc welding at  
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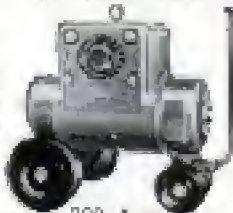
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Mounted on an old truck wheel, a machinist's vise can be hauled or rolled to the job easily when repairing machinery that has broken down in the field. The vise is fastened to the wheel by a large bolt which screws into a hole in the base of the vise.

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## Paper Clip Holds Film Slide On Glass Hood of Camera

A paper clip slipped over the edge of the cover on the ground glass of a press camera provides a convenient place to hold a film slide. For purposes of illustration, a large paper clip is shown in the photograph. A smaller clip should be used to prevent springing the hood or damaging the ground glass of the camera.

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- No machining—no drilling—no tapping. Simply clamp on with ordinary wrench.
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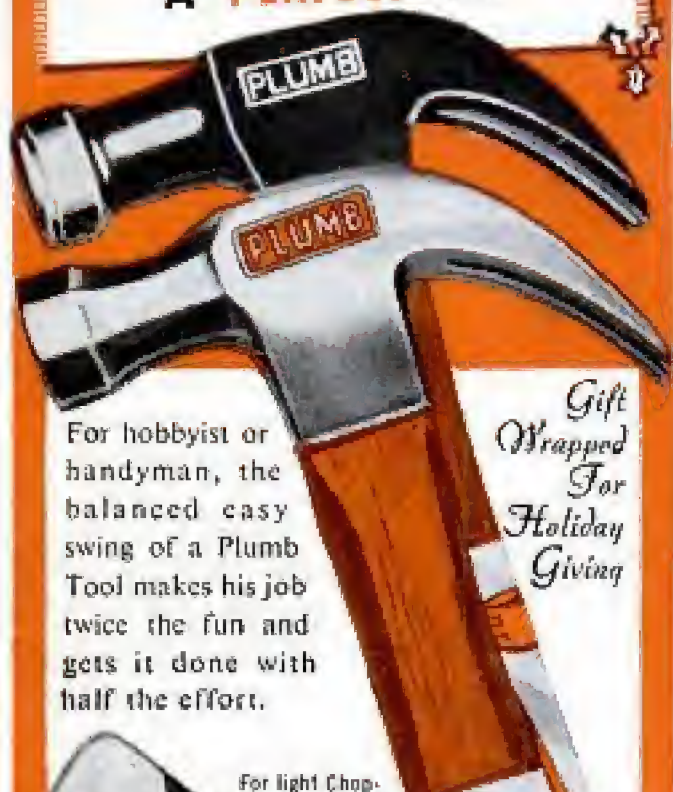
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Particularly useful for preventing injuries to children in sudden stops or turns, a safety harness simply hooks over the back of the front seat. It can be removed or installed instantly. No bolts or screws are used. It prevents the child from standing or leaning against the door and increases the driver's peace of mind, enabling him to devote more of his attention to driving. Although designed principally for children, the harness will provide some protection for adults in minor impacts. The buckle is released with one hand when desired. There are two models, one for four-door sedans, the other for two-door models.

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**AN OUTSTANDING BUY!**  
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Compact — Powerful — Reliable

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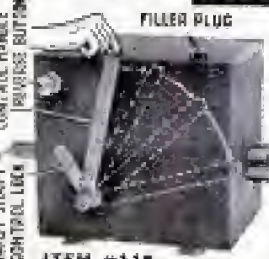
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**The Complete Kit** **NOW ONLY 44.45** complete

For — • Dumping farm wagons • Adjusting depth of plows • Hydraulic jacks • Snow plows.

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All necessary hydraulic fittings. Total ship. wt.—40 lbs. **44.45**

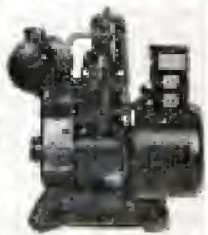
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Flown by remote control on compressed air, a balsa-wood-and-aluminum scale model of a helicopter is being used in pre-flight tests. A full-scale version is to be completed later this year. Although the model looks like a toy, it has flight characteristics resembling those of full-size aircraft. It is controlled by a flight stick similar to the ones in airplanes and can hover, fly backwards, forwards, up or down. The designer, Igor B. Bensen of Raleigh, N. C., can make it land and take off from a bystander's head or a table in the living room. In flights with the model, Bensen says, he has learned that regular-size craft will fly on one of its two engines, make safe power-on emergency landings.

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"Jamming" of Voice of America programs and other long-distance broadcasts can be detected by radarlike methods recently perfected. A special signal is sent from the station's own antenna. The beam follows the same path taken by the radio waves, but bounces back to tell where it has been and about how strong the broadcast signals are when they get there. Often it reveals whether it has run into any interference at its destination. Known as COZI (communications zone indicator), the detection equipment may be used by commercial broadcasters and by shipping concerns as a standard accessory in directional broadcasting. It was developed by the Air Force and Raytheon Manufacturing Company. The Air Force plans to use COZI to test the efficiency and reliability of its worldwide communications system.

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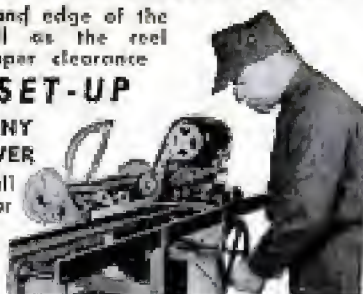
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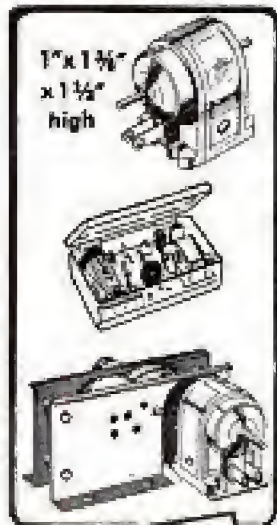
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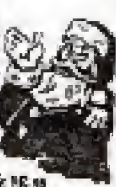
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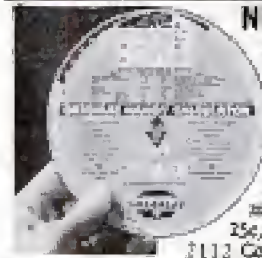
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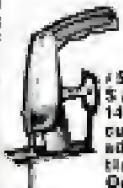


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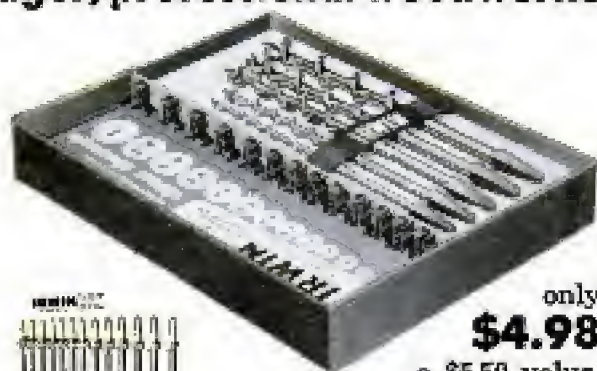
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(Continued from page 103)

instruments, "inch" their way over the top of the world. Knowing the amount of "precession," or drift, due to the rotation of the earth, they direct the pilot to fly an "initial" course that will average out to the "desired grid course" somewhere between the "true" and maximum-error courses. They find this initial course by taking a star shot and resetting the Polar Path every 20 minutes! Thus, the course they fly becomes a series of small circle segments, 20 minutes in length.

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Although the planes were originally designed to carry 54 passengers, only 32 climb aboard for each transpolar flight, 24 in the main cabin and eight in the sleeper section.

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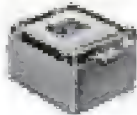


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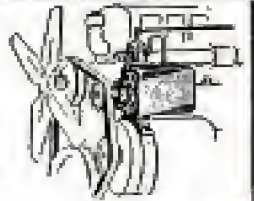


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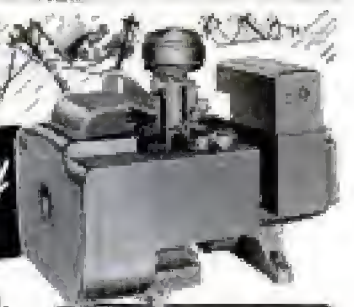
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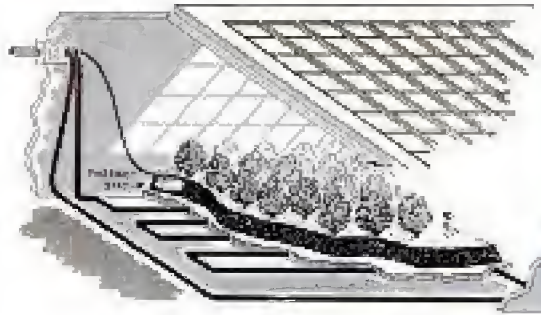
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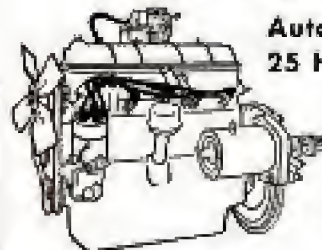
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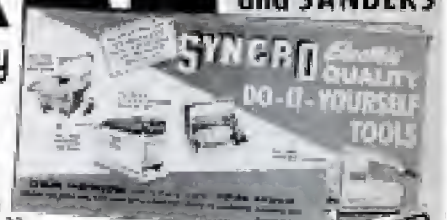
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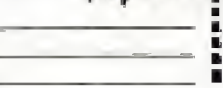
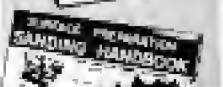
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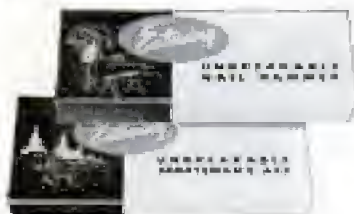
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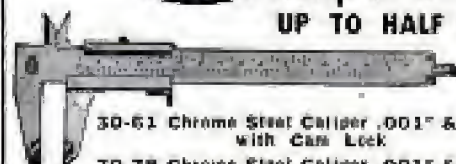
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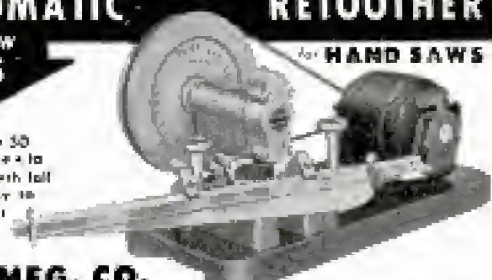
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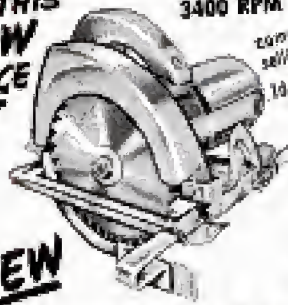
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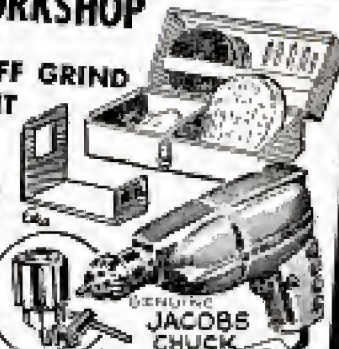
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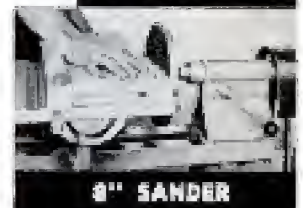
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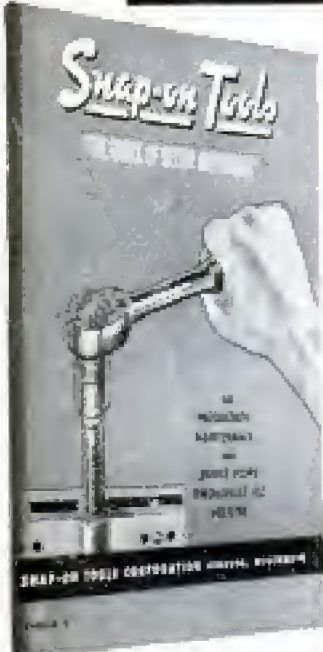
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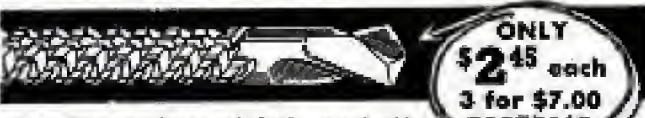
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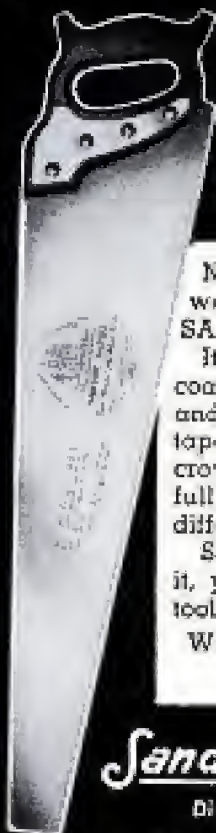
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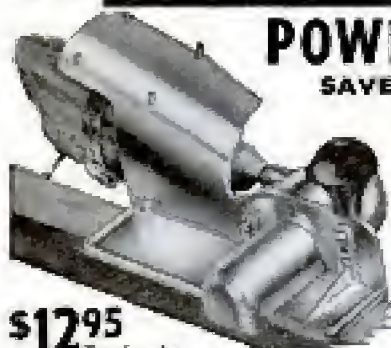
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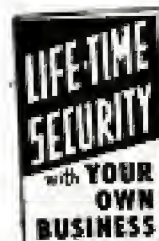


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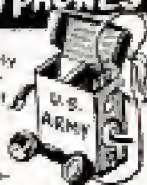
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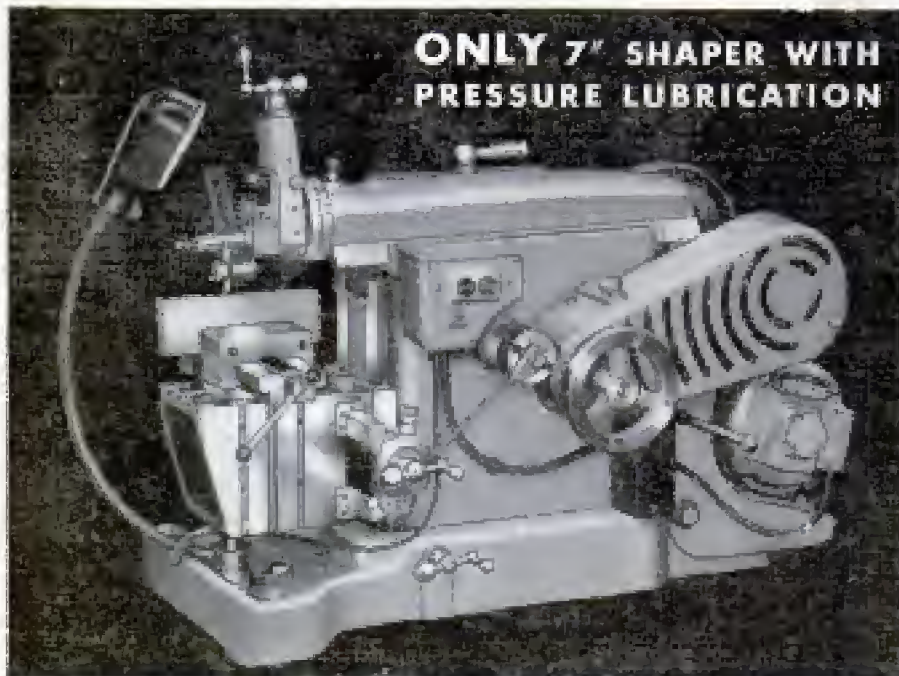
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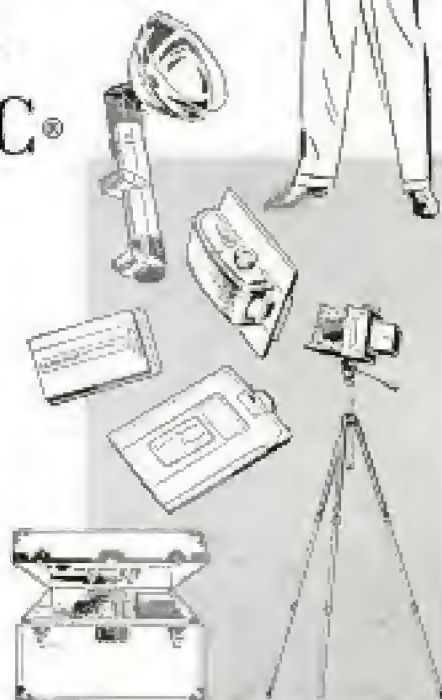
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